

GENERAL INFORMATION FOR ELECTRICAL EQUIPMENT DIRECTORY 2003

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Introduction

This Directory contains the General Guide Information for product categories in UL's Electrical Construction Equipment and Hazardous Locations Equipment Directories. In addition, General Guide Information on selected categories in UL's Electrical Appliance and Utilization Equipment Directory, Fire Protection Equipment Directory, Fire Resistance Directory and Building Materials Directory are also included in this Directory. Attention is directed specifically to the General Guide Information following the product category headings which describe limitations of the Listings, such as current, voltage and horsepower and installation provisions. The scope and sizes and ratings specified in the General Guide Information is intended to indicate the current range of Listings, and is not necessarily indicative of the limitations for Listing.

This Directory does not contain the names of companies authorized to use the UL Mark, nor does it contain specific identification of products which are authorized to bear the UL Mark. Such information appears in the Electrical Construction Equipment Directory, Hazardous Locations Equipment Directory, Electrical Appliance and Utilization Equipment Directory, Fire Protection Equipment Directory, Fire Resistance Directory and Building Materials Directory.

Only those products bearing the appropriate UL Mark and the company's name, trade name, trademark or other authorized identification should be considered as being covered by UL's Listing or Classification and Follow-Up Service. The UL Mark provides evidence of listing or labeling which may be required by installation codes or standards.

Many of the products bearing the UL Mark incorporate components that bear the UL Recognized Component Mark . The Recognized Component Mark is applicable to components that are incomplete in construction features or limited in performance capabilities. **The Recognized Component Mark does not provide evidence of listing or labeling which may be required by installation codes or standards.**

This Directory contains General Guide Information in effect as of April 11, 2003. Information on new or revised product categories established after the effective date will be found in UL's Online Certifications Directory at www.ul.com and will appear in the next annual printed Directory.

Note: At the back of this Directory is important information about UL services for manufacturers and other clients, regulatory authorities, and consumers.

Installation and Use of Products Bearing the UL Mark

Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Listed or Classified products, equipment, systems, devices and materials.

Use of this Directory

This Directory includes the following:

- General Guide Information for each product category that includes references to the requirements used for the investigation of the products and the UL Mark to be used on the product;
- Information relating to limitations or special conditions applying to the product;
- The titles and designations of standards or requirements that have been used for the investigation of products in a specific product category

UL Listing and Classification information is arranged alphabetically in this Directory by product category. The four-letter code (shown in parenthesis) following each category title is the product category guide designation.

To assist in the use of the Directory, an Index of Product Categories is provided

UL's General Guide Information for each product category provides important information regarding the scope and limitation of UL's certification of the product and a general description of the UL Marks authorized for products in that category.

This information may include the identification of published standards that have been used to investigate products in that category. There may not be a published standard against which a product can be tested and evaluated to determine its acceptability for the UL Mark. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from standards and other sources and will develop requirements to cover uses and conditions for which specific requirements did not previously exist.

The scope of each UL Standard for Safety and Outline of Investigation can be accessed at no cost by setting your browser's URL to <http://ulstandardsinfolnet.ul.com>.

For some product categories, UL's Listing Information database may include additional product information that does not appear in the Directory.

Look for the UL Mark

Identification of UL Listed and Classified Products

The symbol  and the name "Underwriters Laboratories Inc." in various forms and abbreviations are registered with the U.S. Patent and Trademark Office, and in numerous other countries. Subject to the terms of UL's Follow-Up Service Agreement, companies are permitted to use the symbol  or other specified forms of UL's name as part of the UL Mark on products which are Listed or Classified and which comply with UL's requirements.

The product name as indicated in the General Guide Information for each product category is generally included as part of the UL Mark, but may be omitted when, in UL's opinion, the use of the name is unnecessary and the UL Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar processes.

A separable UL Mark (not part of a nameplate and in the form of decals, stickers or labels) will always include the following four elements: UL's symbol , the word "LISTED" or "CLASSIFIED," the product or category name, and a control number assigned by UL.

The complete UL Mark will appear on the product unless otherwise indicated in the General Guide Information for a specific product category.

When a UL Listed product is of such a size, shape, material or surface texture that, in UL's opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Listing Mark will appear on the smallest unit container in which the product is packaged. In these cases UL may authorize the use of the UL symbol  on the product in addition to the complete UL Mark on the package.

When a UL Classified product is of such a size, shape, material or surface texture that, in UL's opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Classification Mark will appear on the smallest unit container in which the product is packaged. In these cases there shall be no reference to UL on the product.

Refer to the General Guide Information for each product category for additional information on the specific UL Mark for the products in the category.

Identification of UL Listed Products

The UL Listing Mark generally includes the UL symbol or it may include other registered forms as authorized by UL. The UL Listing Mark includes: (1) the UL symbol shown below; (2) the word "LISTED"; (3) the product identity; and (4) a control number assigned by UL.

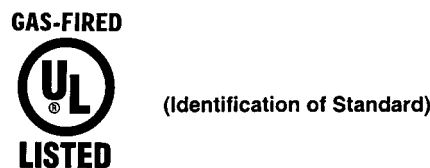


Identification of UL Listed Gas-Fired Products

The UL Listing Mark for gas-fired products certified to UL Standards includes: (1) the UL symbol with the words “GAS-FIRED” above the UL symbol as shown below; (2) the word “LISTED”; (3) the product identity; and (4) a control number assigned by UL.



The UL Listing Mark for gas-fired products certified to ANSI Z21 or Z83 Series Standards includes: (1) the UL symbol with the words “GAS-FIRED” above the UL symbol as shown below; (2) the word “LISTED”; (3) the ANSI/CSA or ANSI/CGA Standard designation; and (4) a control number assigned by UL.

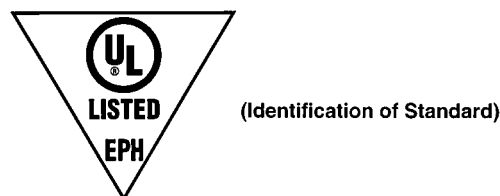


Identification of UL Listed Environmental and Public Health (EPH) Products

The UL Listing Mark for Environmental and Public Health (EPH) products certified to UL Standards includes: (1) the UL symbol with the letters EPH inside a triangular background as shown below; (2) the word “LISTED” below the UL symbol; (3) the product identity; and (4) a control number assigned by UL.



The UL Listing Mark for Environmental and Public Health (EPH) products certified to Standards of other organizations for foreseeable hazards includes: (1) the UL symbol with the letters EPH inside a triangular background as shown below; (2) the word “LISTED” below the UL symbol; (3) the product identity; (4) the Standard designation; and (5) a control number assigned by UL.



Identification of UL Classified Products

The UL Classification Mark may appear in various forms as authorized by UL. The UL Classification Mark includes: (1) the UL symbol; (2) the word “CLASSIFIED” above the UL symbol; (3) the product identity; (4) a control number assigned by UL; and (5) indication of the extent of UL’s evaluation of the product, e.g. “AS TO (nature of hazard) ONLY”; rating or classification as specified in the General Guide Information pertaining to the product category; “IN ACCORDANCE WITH (designation and title of standard published by other organization)”; or “FOR USE WITH (identification of specified product).” A typical Classification Mark is shown below:



**AS TO (nature of hazard) ONLY
or
IN ACCORDANCE WITH
(Identification of Standard)**

Identification of UL Classified Environmental and Public Health (EPH) Products

The UL Classification Mark for Environmental and Public Health (EPH) products certified to Standards of other organizations for EPH evaluations only includes: (1) the UL symbol with the letters EPH inside a triangular background, as shown below; (2) the word “CLASSIFIED” above the UL symbol; (3) the product identity; (4) the Standard designation; and (5) a control number assigned by UL.



(Identification of Standard)

Additional information regarding the UL Marks for Environmental and Public Health (EPH) can be found in the back of this directory under **Other UL Services** and online at www.ul.com/eph.

Identification of UL Listed Products that are Also Classified in Accordance with International or Regional Standards

The UL Listing Mark and Classification Mark shown above can be combined for products that not only meet the applicable UL requirements but also comply with the requirements of the applicable International or Regional standards. For these products the combination UL Listing and Classification Mark is shown below:



**ALSO CLASSIFIED IN
ACCORDANCE WITH
(Identification of Standard)**

Identification of Products Classified in Accordance with International or Regional Standards Only

UL provides a service for the Classification of products that have been determined to comply with the appropriate requirements of the applicable International or Regional standards only. For these products, the Classification Mark may appear in various forms as authorized by UL. A typical form which may be authorized is shown below. When the complete Classification Mark cannot be applied to the product, no reference to “Underwriters Laboratories Inc.” on the product is permitted.



**(Product Identity)
IN ACCORDANCE WITH
(Identification of Standard)
(Control Number)**

Products Listed by Report

Certain products are Listed under a special service designated as “Listed by Report.” These are usually products or constructions for which there are no generally recognized installation requirements. The description of this type of product or construction and information concerning proper field assembly

and/or installation are contained in a Report identified by the reference and date shown by the Listing. Products Listed by Report are eligible to bear a UL Mark which includes a reference to the Report number and date. Copies of the Report may be obtained upon application to the company whose product is Listed.

Specifying UL Listed and Classified Products

Specifying UL Listed and Classified products up front is one of the best methods used by designers, consultants, insurers and others to help gain jurisdictional acceptance. A typical specification reads: "The (product) must bear the UL Mark." Or, if the specification cannot be that specific, an alternate wording would read: "The (product) must meet the requirements of Underwriters Laboratories Inc.® The UL Mark on the product will be accepted as evidence of compliance."

Products, equipment and materials evaluated by UL in accordance with International or Regional standards only are intended for installation and use where the specified standards have been adopted.

Field Engineering Services

The UL Mark applies to the product as it is originally manufactured, when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of an alteration or repair may be on the safety of the product or the continued validity of the UL Certification unless the field alterations or repairs have been specifically evaluated by UL. Unless UL evaluates a modified or rebuilt product, UL cannot indicate whether such changes "void" the UL Mark, or that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the marking on the product have been evaluated for use in that product.

UL evaluates installed equipment in the field that does not bear the UL Mark as well as equipment that has been modified after shipment from the factory. A description of UL's Field Engineering Services for the evaluation of installed equipment is described in the back of this Directory.

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2003 General Information from Electrical Construction Equipment Directory

PART I

Electrical Equipment for Use in Ordinary Locations (AALZ)

I. GENERAL

PART I of the General Information for Electrical Equipment directory includes Guide Information for electrical equipment intended for use in ordinary locations as defined in NFPA 70, “National Electrical Code” (NEC). Electrical equipment for installation in hazardous (classified) locations, as defined in the NEC, is covered in UL’s Hazardous Locations Equipment Directory. Electrical equipment for use in hazardous locations may also be used in ordinary locations.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL’s Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL’s Products Certified in Accordance with International and Regional Standards Directory.

Equipment intended for fire protection purposes, including fire suppression equipment, fire alarm equipment, and fire services equipment is covered in UL’s Fire Protection Equipment Directory.

Some ordinary location electrical equipment is provided with special features concerning its use in fire resistive assemblies. Such equipment (e.g., recessed fixtures or outlet boxes) is also Classified for fire resistance as noted in the general Guide Information for the individual product category and is covered in UL’s Fire Resistance Directory.

Equipment used for the storing, containing, conveying, dispensing, regulating or use of flammable and combustible liquids and gases, and controls and detectors for the equipment in this directory are covered in UL’s Flammable and Combustible Liquids and Gases Equipment Directory.

Equipment used in heating, cooling, refrigerating, ventilating and cooking applications, as well as accessories associated with such equipment are covered in UL’s Heating, Cooling, Ventilating and Cooking Equipment Directory.

Equipment for use aboard marine vessels or in a marine environment is covered in UL’s Marine Products Directory.

Plumbing system appliances, fixtures, fittings and piping are covered in UL’s Plumbing and Associated Products Directory.

III. EVALUATION REQUIREMENTS AND STANDARDS

Electrical equipment for use in ordinary locations has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC.

Some products are certified for uses not within the scope of the NEC. Such products are evaluated for the specifications or the use conditions indicated in the general Guide Information for each product category.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

The general Guide Information for each product category describes the limitations relative to the products covered, such as current, voltage and horsepower limits, markings, special descriptions and installation provisions.

IV. INSTALLATION REQUIREMENTS

Ordinary locations as defined in the NEC include:

Damp Location — Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, barns, and cold-storage warehouses.

Dry Location — A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Wet Location — Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, and locations exposed to weather and unprotected.

Outdoor Use — In general, individual appliances and equipment have been investigated only for use indoors, in dry locations. An exception is where outdoor use is specifically permitted by the Article of the NEC concerned with the product installation. See also the general Guide Information for the product category or included in the individual Listing. In some cases the title (e.g., Snow Movers, Swimming Pool Fixtures) indicates the conditions for which the product has been investigated.

Cord and plug-connected appliances obviously intended for outdoor use, such as gardening appliances, are not intended for use in the rain, and should be stored indoors when not in use.

Enclosure Types

Section 110.11 of the NEC specifies that equipment shall be identified for use in certain operating environments. Section 300.6 provides guidance regarding protection against corrosion and Table 430.91 provides the basis for selecting motor controller enclosure types for use in specific locations. To assist inspection authorities, UL requires type designations on power distribution and control equipment enclosures such as cabinets and cutout boxes, enclosed panelboards or switchboards, meter sockets, enclosed circuit breakers or switches, industrial control and other equipment. The following table summarizes the intended uses of the various type enclosures for other than hazardous locations:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use.
2	Indoor use, limited amounts of falling water.
3R	Outdoor use, undamaged by the formation of ice on the enclosure.**
3	Same as 3R plus windblown dust.
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden.
4	Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure.**
4X	Same as 4 plus resists corrosion.
5	Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Same as 3R plus entry of water during temporary submersion at a limited depth.
6P	Same as 3R plus entry of water during prolonged submersion at a limited depth.
12, 12K	Indoor use, dust, dripping noncorrosive liquids.
13	Indoor use, dust, spraying water, oil and noncorrosive coolants.

*All type enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All type enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

An enclosure that complies with the requirements for more than one type of enclosure may be marked with multiple designations.

Enclosures marked with a type may also be marked as follows:

A Type 1 enclosure may be marked "Indoor Use Only."

A Type 3, 3S, 4, 4X, 6 or 6P enclosure may be marked "Raintight."

A Type 3R enclosure may be marked "Rainproof."

A Type 4, 4X, 6 or 6P enclosure may be marked "Watertight."

A Type 4X or 6P enclosure may be marked "Corrosion Resistant."

A Type 2, 5, 12, 12K or 13 enclosure may be marked "Driptight."

A Type 3, 3S, 5, 12K, or 13 enclosure may be marked "Dusttight."

For equipment designated "Raintight," testing designed to simulate exposure to a beating rain will not result in entrance of water. For equipment designated "Rainproof," testing designed to simulate exposure to a beating rain will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure. "Watertight" equipment is so constructed that water does not enter the enclosure when subjected to a stream of water. "Corrosion resistant" equipment is so constructed that it provides degree of protection against exposure to corrosive agents such as salt spray.

"Driptight" equipment is so constructed that falling moisture or dirt does not enter the enclosure. "Dusttight" equipment is so constructed that circulating or airborne dust does not enter the enclosure.

Sizes and Ratings

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

Marked ratings of utilization equipment include ampere, wattage or volt-ampere ratings. Motor-operated utilization equipment may also be marked with a horsepower rating. The actual marked ratings (other than the horsepower rating) and other markings or instructions, if any, are to be used to select branch circuit conductors, branch circuit overcurrent protection, control devices and disconnecting means.

The ampere or wattage marking on power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Appliance and Utilization Equipment Terminations

Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations

Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked "75C" or "60/75C," it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75°C or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75°C or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75°C or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper-clad Aluminum Conductors — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded, unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Wire Connectors — Combinations of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wire Connectors and Soldering Lugs (ZMVV).

Terminals — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment and appliances, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

V. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VI. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate whether such changes "void" the UL Mark, or that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VII. MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been evaluated in accordance with the applicable requirements of UL, the United States Coast Guard, the American Boat and Yacht Council Inc. and the National Fire Protection Association. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL's Marine Mark is suitable for use only with stranded copper wire.

ADVERTISING DISPLAYS, NONILLUMINATED (AAVU)

This listing covers electrically operated, nonilluminated, units intended to draw attention to, or to display, demonstrate or advertise products.

Advertising displays intended for permanent installation indoors only are so marked. Cord and plug connected advertising displays suitable for outdoor use are marked "Outdoor".

Advertising displays including illumination, are Listed under Electric Signs (UXYT). Advertising displays that include a changing message sign are covered under the categories of Electric Signs (UXYT) and Signs, changing message (UYFS).

The basic standards used to investigate products in this category are UL48, "Electric Signs" and UL73, "Motor-Operated Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Advertising Display", "Non-Illuminated Advertising Display", "Animated Display", or other appropriate product name.

ALUMINUM SHEATHED CABLE FITTINGS (ARYV)

This listing covers fittings for use with aluminum sheathed cable, Type ALS. Nonmetallic parts, such as glands or seals are required to be suitable for an ambient temperature of 90 C in dry locations. The fittings are suitable for use in dry or wet locations except that those fittings suitable for use only in dry locations are so marked on the device or shipping carton.

Aluminum Sheathed Cable Fittings are marked with the range of cable and type of cable sheath (corrugated or smooth) for which they have been investigated, or this marking may be on the carton.

Aluminum sheathed cable fittings made of aluminum are not considered suitable for use in concrete or cinder fill unless protected with asphalt paint or the equivalent.

The basic standard used to investigate products in this category is UL514, "Electrical Outlet Boxes and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Aluminum Sheathed Cable Fitting", "Aluminum Sheathed Cable Connector", "Connector", or other appropriate product name.

APPLIANCE CONTROLS (ATNZ)

This Listing covers remotely operated devices which are cord connected or direct plug-in and are intended for household use. They are intended to control cord connected appliances, portable lamps, etc. Maximum ratings are 16 Amp, 2000 VA, 300 V. They are not intended for controlling motor operated appliances unless specifically identified for such use, e.g. appliance controls designated for control of electric fans.

The effects of the controls on the performance ratings of the connected loads have not been evaluated by Underwriters Laboratories Inc.

The basic standard used to investigate products in this category is UL508, "Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Appliance Control".

APPLIANCE CONTROLS (ATYZ)

These products are Appliance Control such as cord connected power factor controllers rated less than 1 hp intended for use with specific types or classes of appliances. The controls have been investigated by UL to determine that when used in accordance with the manufacturer's instructions they do not adversely affect operation of the appliance. Manufacturer's claims for energy savings have not been evaluated by UL.

See Industrial Control Equipment for the Listing of Industrial types of power factor controllers.

The basic Standards used to investigate the appliance controls in this category are UL 508 "Industrial Control Equipment" and any other UL Electrical Standard applicable to the type products.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.

FOR USE WITH A SPECIFIC APPLIANCE:

APPLIANCE CONTROL

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®

WITH RESPECT TO ELECTRICAL FIRE AND SHOCK

HAZARDS ONLY. FOR USE ONLY WITH (PRODUCT

CATEGORY) MODEL _____ MANUFACTURED BY _____

FOR USE WITH A SPECIFIC CLASS OF APPLIANCE:

APPLIANCE CONTROL

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.

WITH RESPECT TO ELECTRICAL, FIRE AND SHOCK

HAZARDS ONLY. FOR USE ONLY WITH UL LISTED

(SPECIFIC TYPE OF PRODUCT).

APPLIANCE OUTLET CENTERS (AUJZ)

Appliance Outlet Centers are factory-built assemblies incorporating pre-installed materials and equipment which after installation are usually concealed and may not be accessible for inspection at the installation site.

Materials, including the methods used for installation of electrical, mechanical and plumbing equipment incorporated in these assemblies by their manufacturer have been judged under the requirements of the Laboratories which are based on the National Electrical Code, National Fire Code and Model Building, Plumbing and Mechanical Codes.

These appliance outlet centers are intended for installation subject to approval by the authority having jurisdiction.

Appliance outlet centers consist of one or more electrical outlets and may have one or more outlets of another type (I.E. gas, steam, water supply and drain), supported within a suitable enclosure. The enclosure itself may consist of individual components providing some compartmentalization and a single cover may be provided to enclose all compartments. They are intended for permanent indoor installation where more than one appliance may be used simultaneously. They are for connection to feeder circuits consistent with their marked ratings. Components utilized in the assembly of appliance outlet centers shall be suitable for the use and are investigated to conform with the standard for safety which would be used if the component were to be submitted separately.

COMMERCIAL APPLIANCE OUTLET CENTERS (AUUZ)

These appliance outlet centers consist of a group of outlets with or without suitable branch circuit overcurrent protective devices, branch circuit switching and/or timer provisions. These products are not intended for use in residential dwellings. See general information card for Guide AUJZ.

The basic standard used to investigate products in this category is UL891, "Dead-Front Electrical Switchboards".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name

"Commercial Appliance Outlet Center"

RESIDENTIAL APPLIANCE OUTLET CENTERS (AVGQ)

These products are intended for use in residential dwellings. See general information card for guide AUJZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Appliance Outlet Center."

ARC FAULT CIRCUIT INTERRUPTERS (AVYI)**USE**

This category covers arc fault circuit interrupters intended to mitigate the effects of arcing faults that may pose a risk of fire ignition under certain conditions if the arcing persists.

These devices have been tested to determine their ability to recognize and react to arcing faults. They have also been investigated to determine resistance to unwanted tripping because of the presence of arcing that occurs in control and utilization equipment under normal operating conditions and to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

RATINGS

These devices are rated 120 or 120/240 V, 20 A maximum.

PRODUCT MARKINGS

Arc fault circuit interrupters are marked to identify the type of device to aid the user in determining the intended location in a circuit.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1699, "Arc-Fault Circuit-Interrupters."

ARC FAULT CIRCUIT INTERRUPTERS, BRANCH/FEEDER TYPE (AVZQ)**USE**

This category covers arc fault circuit interrupters intended to be installed at the origin of a branch circuit or feeder, such as at a panelboard, where they can function to de-energize the entire branch circuit when an arc fault is detected.

These devices are intended to provide protection of the branch circuit wiring, feeder wiring, or both, against the unwanted effects of arcing. These devices also provide protection to cord sets and power supply cords connected to receptacles as shown below.

These devices may be self-contained with an enclosure, separate devices intended to be mounted in an enclosure, or integrated as part of another device such as circuit breaker.

PROTECTION PROVIDED

The following branch circuit diagram and arc fault protection table illustrate the protection provided by a branch/feeder AFCI under various arc fault scenarios.

Arc Fault Scenario	Protection Provided
Branch Circuit Wiring	
Parallel Arcing Detection	Y
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	N
Cord Sets (Extension Cords), Power Supply Cords	
Parallel Arcing Detection	Y
Series Arcing Detection	N

Notes

Y - Arc fault protection provided

N - Arc fault protection not provided

(#) - Branch circuit wiring systems without ground were permitted prior to the 1962 NEC

Parallel arcing detection includes arcing line-to-line and line-to-ground

RATINGS

These devices are rated 15 or 20 A, 120 or 120/240 V.

ADDITIONAL INFORMATION

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-

tory) together with the word "LISTED," a control number, and the product name "Branch/Feeder Arc Fault Circuit Interrupter" or "Branch/Feeder AFCI."

ARC FAULT CIRCUIT INTERRUPTERS, COMBINATION TYPE (AWAH)

This category covers arc fault circuit interrupters that have been evaluated to provide protection of the branch circuit wiring, feeder wiring, or both, and cord sets and power-supply cords connected to receptacles against the unwanted effects of arcing.

These devices may be self-contained with an enclosure, separate devices intended to be mounted in an enclosure or outlet box, or integrated as part of another device such as a circuit breaker or outlet receptacle.

These devices are rated 15 or 20 A, 120 V.

For additional information, see Arc Fault Circuit Interrupters (AVYI).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: "Combination Arc Fault Circuit Interrupter" or "Combination AFCI".

ARC FAULT CIRCUIT INTERRUPTERS, CORD TYPE (AWAY)

USE

This category covers arc fault circuit interrupters that are intended to be connected to a receptacle outlet.

These devices are intended to provide protection to the power supply cord connected to it against the unwanted effects of arcing. The cord may be integral to the device. The device has no additional outlets.

RATINGS

These devices are rated 20 A maximum, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Arc Fault Circuit Interrupter" or "Cord AFCI."

ARC FAULT CIRCUIT INTERRUPTERS, OUTLET BRANCH CIRCUIT TYPE (AWBZ)

USE AND INSTALLATION

This category covers arc fault circuit interrupters that have been evaluated to provide protection of the downstream branch circuit wiring, cord sets and power-supply cords against the unwanted effects of arcing. These devices also provide protection to upstream branch circuit wiring as shown below.

These devices have feed-through connections.

These devices are intended to be installed as the first outlet in a branch circuit.

PROTECTION PROVIDED

The following branch circuit diagram and arc fault protection table illustrate the protection provided by an outlet branch circuit AFCI under various arc fault scenarios.

Arc Fault Scenario	Protection Provided
Branch Circuit Wiring – First Leg	
Parallel Arcing Detection	N
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	Y
Branch Circuit Wiring – Beyond First Leg	
Parallel Arcing Detection	Y
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	Y
Cord Sets (Extension Cords), Power Supply Cords	
Parallel Arcing Detection	Y

Arc Fault Scenario
Series Arcing Detection

Protection Provided
Y

Notes

Y - Arc fault protection provided

N - Arc fault protection not provided

(#) - Branch circuit wiring systems without ground were permitted prior to the 1962 NEC

Parallel arcing detection includes arcing line-to-line and line-to-ground RATINGS

These devices are rated 15 or 20 A, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1699A, "Outline of Investigation for Outlet Branch Circuit AFCIs."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Branch Circuit Arc Fault Circuit Interrupter" or "Outlet Branch Circuit AFCI."

ARC FAULT CIRCUIT INTERRUPTERS, OUTLET CIRCUIT TYPE (AWCG)

USE AND INSTALLATION

This category covers arc fault circuit interrupters that are intended to be installed at a branch circuit outlet, such as an outlet box.

These devices are intended to provide protection of cord sets and power-supply cords connected to it against the unwanted effects of arcing. These devices may provide feed-through protection of the cord sets and power-supply cords connected to downstream receptacles.

These devices may or may not have feed-through connections.

These devices may or may not have integral receptacles.

RATINGS

These devices are rated 15 or 20 A, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Circuit Arc Fault Circuit Interrupter" or "Outlet Circuit AFCI."

ARC FAULT CIRCUIT INTERRUPTERS, PORTABLE TYPE (AWDO)

USE

This category covers arc fault circuit interrupters that are intended to be connected to a receptacle outlet. They are provided with one or more outlets.

These devices are intended to provide protection to connected cord sets and power supply cords against the unwanted effects of arcing.

RATINGS

These devices are rated 20 A maximum, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Arc Fault Circuit Interrupter" or "Portable AFCI."

ARCHITECTURAL AND FLOATING FOUNTAINS (AWEG)

USE AND INSTALLATION

This category covers electrical equipment systems intended for installation in accordance with Article 680, Part E, of the National Electric Code, NFPA 70. Equipment may consist of pumps (including submersible pumps), lights, control panels, and timers. Equipment may also include wind sensors, light detectors, freeze prevention equipment, and the like. These systems may be submersible or intended for remote installation. Systems suitable for outdoor use are so marked.

RELATED PRODUCTS

Similar equipment with overall dimensions less than 5 ft are covered under Fountains, Small Decorative (IQRW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 778, "Motor-Operated Water Pumps," UL 676, "Underwater Lighting Fixtures" and UL 508A, "Industrial Control Panels."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Architectural Fountain," "Floating Fountain," "Floating Fountain Equipment," or other appropriate product name as shown in the individual Listings.

ARMORED CABLE (AWEZ)**GENERAL**

This category covers armored cable in sizes 14-1 AWG copper and 12-1 AWG aluminum or copper-clad aluminum and rated 600 V or less. Aluminum-armored cable is suitable for use in alternating current circuits only. Armored cable is for use in accordance with Article 320 of NFPA 70, "National Electrical Code."

ACTH — Indicates armored cable rated 75°C employing conductors having thermoplastic insulation.

ACTHH — Indicates armored cable rated 90°C employing conductors having thermoplastic insulation.

ACHH — Indicates armored cable rated 90°C employing conductors having thermosetting insulation.

Armored cable connectors (box connectors) other than the direct bearing setscrew type are suitable for use on cable employing aluminum armor.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKINGS

Armored cable complies with the Flame and Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" and may be marked with the suffix "LS" and/or "For Use in Cable Trays."

Cable with aluminum armor is identified with the words "ALUMINUM ARMOR" on a marker tape and tag on coils.

Cable with copper-clad aluminum conductors is identified with the designation "AL (CU-CLAD)" or "Cu-Clad AL" on a tag, on the carton or reel. Cable with aluminum conductors is identified with the designation "AL" on a tag, on the carton or reel.

In addition, cable with compact-stranded copper conductors is identified with the designation "Compact Copper" or "CMPCT CU" following the conductor size and the words "Terminate with connectors identified for use with compact-stranded copper conductors" on a tag, on the carton or reel.

RELATED PRODUCTS

For fittings suitable as a grounding means, see Armored Cable Connectors (AWSX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 4, "Armored Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Armored cable that contains copper or copper-clad aluminum conductors has the product name "Armored Cable"; armored cable that contains aluminum conductors has the product name "Armored Aluminum Cable." Armored cable that has aluminum armor has the product name "Aluminum Armored Cable."

ARMORED CABLE CONNECTORS, TYPE AC (AWSX)**GENERAL**

This category covers armored cable connectors suitable for use with armored cable (Type AC).

Additional Fittings — Connectors covered under Metal-clad Cable Connectors, Type MC (PJOX) and Power and Control Tray Cable Connectors (QPOZ) are also suitable for use with armored cable when specifically indicated on the device or carton. Temporary wiring, such as flexible cables or cords, may be secured by the use of a connector suitable for use with flexible cord.

Grounding — Armored cable connectors (Type AC) are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with NFPA 70, "National Electrical Code."

Size of Cable Used — Connectors of the 3/8 in. trade size, unless marked otherwise, are capable of holding a No. 14-2 armored cable and any larger size which it will accommodate.

Use with Aluminum Cable — Connectors other than direct bearing set screw type are suitable for use with aluminum armored cable.

PRODUCT MARKINGS

Some connectors are also acceptable for use with flexible metal conduit, flexible cord, nonmetallic sheathed cable, metal clad (Type MC), service entrance cable, flexible nonmetallic tubing, or armored optical fiber cable as indicated on the device or carton. Connectors for use with nonmetallic sheathed cable are also suitable for use with multiconductor underground feeder and branch circuit cable where used in dry locations.

ADDITIONAL INFORMATION

For additional information, see Armored Cable (AWEZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Armored Cable Connector."

ATTACHMENT PLUGS (AXGV)**GENERAL:**

The three sub-categories below cover the following attachment plug products:

Attachment Plugs, Fuseless

Attachment Plugs with Switch

Attachment Plugs with Overload Protection

These listings cover the following types of products:

Adapter — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle), adapts a receptacle to a lampholder, or adapts a lampholder to a receptacle (also known as a separable attachment plug). (See EMDV for listings of similar products.)

Appliance Coupler — A single-outlet female contact device to be wired on flexible cord as part of a detachable power supply cord to be connected to a male inlet of an appliance.

Appliance or Flatiron Plug — An appliance coupler type of device having a slot configuration specified for use with heating or cooking appliances.

Attachment Plug — A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

Male Inlet (Equipment Inlet, Motor Attachment Plug) — A male contact device to be mounted on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

Nonseparable Attachment Plug — An adaptor having a male screw shell and a pair of wire leads to be connected to utilization equipment.

Separable Attachment Plug — An adaptor having a male screw shell and a slot configuration outlet.

Shore Power Inlet — A male inlet intended to provide power supply connection to boats moored to a dock. Shore power inlets are also Listed under Shore Power Inlets, Marine in the "Marine Products Directory".

Table Tap — A cord connector having more than one outlet and intended to rest on a horizontal surface while in use.

These listings do not cover devices to be molded on flexible cord or wire and unassembled devices to be factory assembled on flexible cord or wire.

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Such devices are complete only after installation of the flexible cord or wire and they are judged as part of a complete assembly.

These listings do not cover pin and sleeve type devices. Refer to the category of Pin and Sleeve Type Plugs, Receptacles and Cable Connectors (QLGD) for further information on these products.

The basic standard used to investigate products in these subcategories is UL 498, "Attachment Plugs and Receptacles".

RATINGS:

These devices are rated 600 volts or less, ac or dc; 200 amps or less. They may also be rated in horsepower as noted in the individual subcategories.

Outlet devices rated 250 volts are tested on circuits involving a nominal potential to ground of 125 volts. Outlet devices having other voltage ratings are tested on circuits involving full rated potential to ground except for multiphase rated devices which are tested on circuits consistent with their voltage ratings, i.e. a 120/208 volt, 3-phase, device is tested on a circuit involving 120 volts to ground.

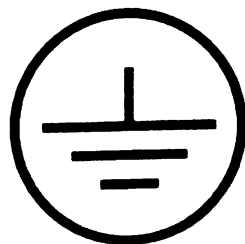
TERMINALS:

The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the National Electrical Code. The ampacity of the flexible cords and cables is based on Section 400-5, tables 400-5(A) and 400-5(B). The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. The terminations are based on the use of 60 C flexible cord or cable.

The terminations of devices intended to be wired onto branch circuit conductors are based upon the use of 60 C insulated conductors in circuits rated 100 amps or less, and the use of 75 C insulated conductors in circuits rated more than 100 amps, as specified in Table 310-16 of the National Electrical Code.

GROUNDING:

Devices having a terminal identified by a green-colored finish, the words "green" or "ground", the letters "G" or "GR", or the grounding symbol are grounding types. The blade, pin or contact number connected to this



terminal is for equipment grounding only.

ENCLOSURES:

In general, devices having integral enclosures or installed as intended have been investigated for use indoors, in dry locations. All such Listed products provide a degree of protection against ordinary corrosion, accidental contact with live parts, and a limited amount of falling dirt. Some devices have been evaluated for use in other operating environments when unmated and when mated with other devices in the same manufacturer's line of products. They are marked with one of the type designations 2 through 6, 12 and 13 indicated in the guide for Equipment for Use in Ordinary Locations (AALZ) at the beginning of this directory. All outdoor types provide a degree of protection against rain, snow, and sleet. Outdoor types are also suitable for use indoors if they meet the environmental conditions present. A device that complies with the requirements for more than one type of enclosure may be marked with multiple designations. Complete use and mating information is provided in the installation instructions provided with each device.

ATTACHMENT PLUGS, FUSELESS (AXUT)

This listing covers adapters, appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors, male inlets (equipment inlets, motor attachment plugs), nonseparable attachment plugs, separable attachment plugs, shore power inlets and table taps. These devices do not incorporate switches or overcurrent protection.

Devices for Use in Hospitals — Attachment plugs and cord connectors Listed for hospital use in other than hazardous locations in accordance with Article 517 of the National Electrical Code are identified (1) by the marking "Hospital Only" (used to identify a specific grounding locking configuration rated 20 A, 125 V used for the connection of mobile x-ray and similar equipment) or (2) by the marking "Hospital Grade" and a green dot on the device. Male inlets may be identified only by the marking "Hospital only". The identification is visible after installation on the flexible cord or, in the case of the male inlets, on the utilization equipment.

Federal Specification — Some Listed attachment plugs, cord connectors and male inlets in this category have been investigated for compliance

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with Federal Specification W-C-596, "General Specification for Electrical Power Connectors". Such devices are identified by a Listing Mark augmented by the capital letters "F" and "S" each in a wing on either side of the UL Mark. The manufacturer may also include the Federal Specification number "W-C-596F" or "W-C-596G" or the Federal Specification part number (which consists of the appropriate specification sheet and dash number described in the specification) on the device or on the smallest container in which the device is packaged.

Terminals — Terminals of appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors and table taps are intended for use with stranded copper conductors of the type used in flexible cord. Terminals of male inlets (motor attachment plugs) and shore-power inlets of the wire-binding screw, setscrew, or screw-actuated back-wired clamping types are suitable for use with both solid and stranded wires.

Horsepower Ratings — In addition to ampere and voltage ratings, standard AC horsepower ratings corresponding to the amp and voltage ratings assigned to specific attachment plugs not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use an attachment plug having a horsepower rating not less than 1.4 times the standard AC horsepower rating. The NEMA configuration designation is included for reference. Devices other than attachment plugs, and attachment plugs of configurations other than those indicated in the Table, have horsepower ratings only if such ratings are marked on the device.

HORSEPOWER RATINGS FOR NEMA CONFIGURATION ATTACHMENT PLUGS

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
15	125	1	2	2	1-15, L1-15	1/2
	125	1	2	3	5-15, L5-15	1/2
	250	1	2	2	2-15	1-1/2#
	250	1	2	3	6-15, L6-15	1-1/2#
	277	1	2	3	7-15, L7-15	2
	125/250	1	3	4	14-15	1-1/2 L-L#, 1/2 L-N
	250	3	3	3	11-15, L11-15	2
	250	3	3	4	15-15	2
	120/208	3	4	4	18-15	2
	125	1	2	3	5-20, L5-20	1
20	250	1	2	2	2-20, L2-20	2#
	250	1	2	3	6-20, L6-20	2#
	277	1	2	3	7-20, L7-20	2
	480	1	2	3	L8-20	3
	125/250	1	3	3	10-20, L10-20	2 L-L#, 1 L-N
	125/250	1	3	4	14-20, L14-20	2 L-L#, 1 L-N
	250	3	3	3	11-20, L11-20	3
	250	3	3	4	15-20, L15-20	3
	480	3	3	3	L12-20	5
	480	3	3	4	L16-20	5
30	120/208	3	4	4	18-20, L18-20	2
	120/208	3	4	5	L21-20	2
	277/480	3	4	4	L19-20	5
	277/480	3	4	5	L22-20	5
	125	1	2	3	5-30, L5-30	2
	250	1	2	2	2-30	2#
	250	1	2	3	6-30, L6-30	2#
	277	1	2	3	7-30, L7-30	3
	480	1	2	3	L8-30	5
	125/250	1	3	3	10-30, L10-30	2 L-L#, 2 L-N
	125/250	1	3	4	14-30, L14-30	2 L-L#, 2 L-N
	250	3	3	3	11-30, L11-30	3
	250	3	3	4	15-30, L15-30	3
	480	3	3	3	L12-30	10
	480	3	3	4	L16-30	10
	120/208	3	4	4	18-30, L18-30	3
	120/208	3	4	5	L21-30	3
	277/480	3	4	4	L19-30	10

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Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
50	277/480	3	4	5	L22-30	10
	125	1	2	3	5-50	2
	250	1	2	3	6-50	3#
	277	1	2	3	7-50	5
	125/250	1	3	3	10-50	3 L-L#, 2 L-N
	125/250	1	3	4	14-50	3 L-L#, 2 L-N
60	250	3	3	3	11-50	7-1/2
	250	3	3	4	15-50	7-1/2
	120/208	3	4	4	18-50	7-1/2
	125/250	1	3	4	14-60	3 L-L#, 2 L-N
	250	3	3	4	15-60	10
	120/208	3	4	4	18-60	7-1/2

L-L: Motor connected line-to-line.

L-N: Motor connected line-to-neutral.

#Also suitable for 208V motor applications at the indicated horsepower rating.

For three phase devices, the horsepower ratings indicated are for three phase motor loads.

Refer to ANSI/NEMA WD 6-1988 for configurations of the NEMA Designations.

Listing Mark — The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits, or on the smallest unit container in which the product is packaged, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate "Fuseless Attachment Plug", "Plug", or other appropriate name.

ATTACHMENT PLUGS WITH SWITCHES (AYIR)

This listing covers appliance couplers, appliance plugs, attachment plugs, male inlets (equipment inlets, motor attachment plugs), and flatiron plugs incorporating switches.

In addition to UL 498, the standard used to investigate products in this category is either UL 20, "General Use Snap Switches", or UL 1054, "Special Use Switches". For additional information, see the information under Snap Switches (WJQR).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory) together with the word "LISTED" (or "LIST").

ATTACHMENT PLUGS WITH OVERLOAD PROTECTION (AYVZ)

This listing covers attachment plugs, separable and nonseparable attachment plugs, cord connectors, and male inlets designed to accommodate standard fuses or provided with circuit breakers or equivalent overcurrent protection.

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits, or on the smallest unit container in which the product is packaged, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Attachment Plug With Overload Protection", "Attachment Plug", "Cord Connector", or other appropriate product name.

BOAT CABLE (BDFX) GENERAL

This category covers boat cable which consists of a single insulated conductor without a jacket or two or more insulated conductors with or without an overall nonmetallic jacket, and which is suitable for use in marine pleasure crafts. Boat cable is rated 600 V or less, 60°C (122°F) or 75°C (167°F) wet, 60 to 200°C dry locations and, for cables so marked, 60°C (140°F) and lower temperatures where exposed to oil. The cable employs stranded copper conductors in a size range of 18 to 4/0 AWG inclusive for multiple-conductors, 16 to 4/0 AWG inclusive for single conductors.

Ampacities shall be in accordance with United States Coast Guard Regulations Title 33, Chapter I Parts 183.430 and 183.435 of the CFR.

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ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1426, "Electrical Cables for Boats."

Cable rated 600 V is tested according to UL 1426. Cable rated 50 V is tested according to SAE J1127, J1128 or J378b.

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Boat Cable."

BOXES, ENCLOSURES, HANDHOLES AND VAULTS, UNDERGROUND, UTILITY SPECIFICATION (BGHL)

This category covers Boxes, Enclosures, Handholes, Vaults, and the associated Covers for underground utility company installations and similar uses. These products are investigated in accordance with the Western Underground Committee Guide 3.6 for Nonconcrete Enclosures, and with additional utility specifications as noted in the individual listings and marked on the products. The products are intended for installation as specified by the Authority Having Jurisdiction. These products provide a level of mechanical protection only. They have not been investigated for protection against environmental conditions.

Boxes, Enclosures, Handholes and Vaults are marked with a Vertical Design Load and a Lateral Design Load. Covers for use with these Boxes, Enclosures, Handholes and Vaults are marked with a Vertical Design Load only. Boxes, Enclosures, Handholes and Vaults are marked to identify Covers which may be used. Covers are also marked to identify the Boxes, Enclosures, Handholes and/or Vaults for which they are suitable. The Vertical Design Load of the system (Box, Enclosure, Handhole or Vault in combination with a Cover) is equal to the lowest Vertical Design Load of either component. The Lateral Design Load is equal to that of the Box, Enclosure, Handhole or Vault.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Underground Box", "Underground Enclosure", "Underground Handhole", "Underground Vault", or "Cover for Underground" (where the blank is filled with Box, Enclosure, Handhole or Vault, as appropriate) or other appropriate product name as shown in the individual Listing, and "investigated IN ACCORDANCE WITH the Standard Western Underground Committee Guide 3.6 for Nonconcrete Enclosures, (+)". In addition, when investigated to additional specifications, the organization name and specification, such as "XYZ Phone Company Specification 123ABC" is also marked on the product.

(+) – The date of the standard to which the product was investigated.

BOXES, JUNCTION AND PULL (BGUZ)

This listing covers sheet-metal boxes, cast metal boxes, and nonmetallic boxes.

All boxes in this category have a volume of more than 100 cu in.

Boxes identified with an enclosure type designation are intended for use as indicated in the guide information at the front of this Directory (AALZ).

PVC junction and pull boxes are suitable for use with PVC rigid nonmetallic conduit. Such boxes are inherently resistant to atmospheres containing common industrial corrosive agents and will also withstand vapors or mists of caustics, pickling acids, plating baths, hydrofluoric and chromic acids.

Cast metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton.

Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton.

Some boxes are intended for the installation of specific kinds of equipment, but the listing does not cover any electrical material or fittings contained in the box except neutral connections intended for use with column type panelboards.

Boxes intended to accommodate metering transformers are covered in "Metering Transformer Cabinets" (PJXS).

See also "Cabinets and Cutout Boxes" (CYIV), "Outlet Boxes" (QCDX), Industrial Control Panel Enclosures (NITW), Metallic Outlet Boxes (QCIT), Nonmetallic Outlet Boxes (QCMZ), and Swimming Pool Junction Boxes (WCEZ).

The basic standard used to investigate products in this category is UL50, "Enclosures for Electrical Equipment".

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and one of the following product names: "Junction and Pull Box", "Junction Box", "Pull Box", "J&P", or other appropriate product name.

BUSWAYS, METAL-ENCLOSED, OVER 600 V (CVZW)

This category covers metal-enclosed busways of the nonsegregated phase type, for use in accordance with Articles 364 and 710 of the National Electrical Code, NFPA 70. Nonsegregated phase busway is one in which all phase conductors are in a common metal enclosure without barriers between the phases.

These are assemblies of metal-enclosed conductors along with associated interconnections, enclosures, and supporting structures.

These assemblies are intended for use on systems with nominal rated voltages from 601 V to 38 kV AC. Current ratings are from 600 to 10,000 A.

These assemblies may be intended for either indoor or outdoor applications. An assembly that has been investigated to determine that it is rainproof is marked: "Rainproof", "Outdoor" or "3R".

Enclosures are of the ventilated or nonventilated type. A ventilated enclosure is provided with means to permit circulation of sufficient air to remove excess heat.

A nonventilated enclosure is constructed to provide no intentional circulation of external air through the enclosure.

These products are marked with the following electrical ratings: rated voltage, rated continuous current, insulation (BIL) level, frequency, rated frequency withstand voltage (dry), and rated short-circuit withstand current (momentary current). When shipped in sections, each section is marked.

The basic standard used to investigate products in this category is ANSI/IEEE C37.23-1987, Guide for Metal-Enclosed Bus and Calculating Losses in Isolated-Phase Bus.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word "LISTED", a control number, and the following product name "Metal-Enclosed Busway".

BUSWAYS AND ASSOCIATED FITTINGS (CWFT)

Ratings 600 volts or less.

Busways and Short-Run Busways are provided with metal enclosures. These enclosures, and in some cases an additional ground bus, are intended for use as equipment grounding conductors.

Some busways are not intended for use ahead of service equipment and are marked with the maximum rating of overcurrent protection to be used on the supply side of the busway.

Busways which have been investigated to determine their suitability for installation in a specified position, or for use in a vertical run, or for support at intervals greater than 5 ft., or for outdoor use are so marked. This marking is on or contiguous with the name plate incorporating the manufacturer's name and electrical rating.

A busway or fitting containing a vapor seal is so marked, but unless marked otherwise, the busway or fitting has not been investigated for passage through a fire rated wall.

Short-Run Busways are marked to limit the run to 30 ft. or less and no more than 10 ft. vertically. They are intended primarily to feed switchboards. Except for transformer stubs, Short-Run Busways are not intended to have intermediate taps. Short-Run Busways are not ventilated and may be marked for outdoor use.

Busways and associated fittings marked "Short Circuit Current Rating(s) Maximum RMS Symmetrical Amps — — — — — Volts — — — — —" have been investigated for the rating indicated.

Busways which are intended to supply and support industrial and commercial lighting fixtures are Classified as "Lighting Busway" and are so marked. Trolley Busway is marked "Trolley Busway" and is additionally marked "Lighting Busway" if intended to supply and support industrial and commercial lighting fixtures. Busway with provision for insertion of plug-in devices at any point along the length of busway and intended for general use is Classified as "Continuous Plug-In Busway" and is so marked. The marking is contiguous with the marking of the manufacturer's name and the electrical rating.

Busway marked "Lighting Busway" and protected by overcurrent devices rated in excess of 20 amp is intended for use only with fixtures employing heavy duty lampholders unless additional overcurrent protection is provided for the fixture in accordance with the National Electrical Code.

"Trolley Busway" should be installed out of the reach of persons or be otherwise installed to prevent accidental contact with exposed conductors.

Some busways have a number of short stubs and are marked for use with certain compatible equipment.

Busways and Fittings as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60 C ampacities for wire sizes No. 14-1 Awg and 75 C ampacities for wire sizes No. 1/0 Awg and larger.

Some fittings are suitable for use as service equipment and are so marked.

The basic standard used to investigate products in this category is UL857, "Busways and Associated Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Busway", "Short-Run Busway", "Busway Plug" or other appropriate product name.

BUSWAYS, METAL-ENCLOSED, OVER 600 V (CXHH)

This Listing covers metal-enclosed busways of the nonsegregated-phase type. Nonsegregated-phase busway is one in which all phase conductors are in a common metal enclosure without barriers between the phases.

These are assemblies of metal-enclosed conductors along with associated interconnections, enclosures, and supporting structures.

These assemblies are intended for use on systems with nominal rated voltages from 2.4 to 34.5 kilovolts AC. Current ratings are from 1200 to 6000 amperes.

These assemblies may be intended for either indoor or outdoor applications. An assembly that has been investigated to determine that it is rainproof is marked: "Rainproof", "Outdoor" or "3R".

Enclosures are of the ventilated or nonventilated type. A ventilated enclosure is provided with means to permit circulation of sufficient air to remove excess heat. A nonventilated enclosure is constructed to provide no intentional circulation of external air through the enclosure.

These products are marked with the following electrical ratings: rated voltage, rated continuous current, insulation (BIL) level, frequency, rated frequency withstand voltage (dry), and rated short-circuit withstand current (momentary current). When shipped in sections, each section is marked.

The basic standard used to investigate products in this category is ANSI/IEEE C37.23-1987, Guide for Metal-Enclosed Bus and Calculating Losses in Isolated-Phase Bus.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word "LISTED", a control number, and the following product name "Metal-Enclosed Busway".

CABINETS AND CUTOUT BOXES (CYIV)

This Listing covers sheet metal boxes and nonmetallic boxes.

Cabinets and cutout boxes identified with an enclosure type designation are intended for use as indicated in the guide information at the front of the directory (AALZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electric Cabinet Front", "Electric Cabinet Box" or "Cutout Box".

The product name "Electric Cabinet Front" is for the front trim or matt used on the flush or surface mounted cabinet box. The product name "Electric Cabinet Box" is for the box only.

The product name "Cutout Box" is for the surface mounted box provided with a swinging door or cover.

The basic standard used to investigate products in this category is UL50, "Enclosures for Electrical Equipment".

The Listing Marks do not cover any material, electrical parts, panelboards, or fittings contained in the box except where a reference to such items is included in the marking.

CABLE ASSEMBLIES AND FITTINGS FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION (CYJV)

USE

This category covers cable assemblies, male and female cable fittings, panel-mounted fittings and feeder-tap fittings used with industrial control equipment. These assemblies are intended to be used in an industrial environment to distribute the control signals and power to remote proximity switches or other control circuit devices. The cable assemblies and mating fittings are not intended to be used as a substitute for the fixed wiring of the building structure. The cable assemblies and mating fittings may be connected to the fixed wiring of the building structure using a feeder tap fitting. These devices are intended for use only with the Listee's same line of products covered under this category.

Cable assemblies and fittings are rated in volts and amperes. The devices are marked with such rating on the device or smallest unit shipping container. The products covered under this category have not been investigated for interruption of current.

Cable Assemblies — Cable assemblies consist of a length of flexible cord with a molded-on or assembled-on male or female connector on at least one end of the cable. Cable assemblies with only one end terminated are intended for direct connection to a proximity switch, control panel, or similar device.

Male and Female Cable Fittings — Fittings intended to be field-wired onto flexible cord may have a male or female insert configuration. The diameter and the wire size of the flexible cord to which the fitting is intended to be assembled is indicated on the fitting or the smallest unit shipping container.

Panel-mounted Fittings — These fittings consist of a panel-mounted assembly with either a male or female insert. Each assembly is provided with a means to secure to a panel. These fittings may be provided with leads intended for direct wiring connection to a control panel, proximity switch, or other similar device.

Feeder-tap Fittings — Feeder-tap fittings consist of field-wiring terminals for feed-through connection to power-limited tray cable or other appropriate cable together with either a female connector to connect to a cable assembly or field wiring terminals to connect to flexible cord suitable for hard use that is the same size and ampacity as the feeder cable. Feeder-tap fittings are intended for use within outlet boxes supported by cable trays in Class 1 power-limited circuits to provide a point of connection to the fixed wiring of the building structure. They may also be installed on Type PLTC cable on open wiring in Class 2 circuits in accordance with Exception No. 3 of Section 725-61(d) of the National Electrical Code. They have been evaluated for electrical insulation, mechanical strength, temperature rise, fault current withstand and effectiveness of grounding path to demonstrate equivalency to the wiring system on which they are intended to be installed.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The products covered under this category are investigated to the Outline of Investigation, SUB 2238.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or smallest unit shipping container in which the product is placed is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Assembly for Industrial Control and Signal Distribution" or

"Cable Assembly Fitting for Industrial Control and Signal Distribution." The cable assemblies which have terminations on one end only may be bulk labeled with the Listing Mark provided on the smallest unit shipping container. All other Listing Marks are applied to each individual device.

CABLEBUS (CYKU)

This category covers cablebus consisting of an assembly of insulated conductors with fittings and conductor terminations in a completely enclosed, ventilated, protective metal housing. Cablebus is intended for installation in accordance with Article 365 of the National Electrical Code and the manufacturer's installation instructions.

Cablebus and associated fittings with a short-circuit rating above 10,000 rms symmetrical amperes are marked with their short-circuit ratings. For example, "Short-circuit Rating: 42,000 rms Symmetrical Amperes, 480V".

Cablebus is of such size that shipment fully assembled is impractical. To supplement the general requirements given in Article 365 of the National Electrical Code, installation instructions describing or illustrating the proper assembly, mounting, and connection of the parts are required to be provided by the manufacturer. The acceptability of the assembled parts in the field rests with the local authority having jurisdiction.

The basic standard used to investigate products in this category is UL857, "Busways and Associated Fittings."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Cablebus", "Cablebus Cover", or other product name as appropriate.

CABLE LIMITERS (CYMT)

This Listing covers cartridge-enclosed cable limiters of the nonrenewable type, rated 600 v maximum. These cable limiters are intended for use on AC circuits only, unless also marked with a DC voltage rating. They have a current interrupting rating of up to 200,000 rms symmetrical amperes. They are suitable for use with copper or aluminum cable when the wire terminals are so marked.

These cable limiters only provide short-circuit protection by isolating damaged cables from the circuit. They have not been investigated to determine their ability to provide overload protection or protection for cables and equipment connected to the load side of the cable limiter. They are not marked "Current Limiting."

Unless marked to indicate otherwise, these cable limiters are intended for use only in dry locations.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Limiter."

CABLE TRAYS (CYNW)

Cable trays are intended for assembly in the field and for use in accordance with Articles 318 and 710 of the National Electrical Code. They have been classified as to their suitability for use as equipment grounding conductors in accordance with Sections 318-3(c) and 318-7(b) of the National Electrical Code.

The cross-sectional area of the grounding metal is marked on the outer surface of the sidewall of the tray.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

CLASSIFIED BY
UNDERWRITERS LABORATORIES INC. ®
AS TO ITS SUITABILITY AS AN
EQUIPMENT GROUNDING CONDUCTOR ONLY.

CABLE TRAYS, NONMETALLIC (CYOV)

This listing covers nonmetallic, including fiberglass (fiber glass reinforced plastic) cable tray systems installed for the support of power and/or control cables.

Nonmetallic cable trays are intended for assembly in the field and for use in accordance with Article 318 of the National Electrical Code.

Listed nonmetallic cable trays are evaluated in accordance with the performance and construction requirements of NEMA FG 1-1993, Fiberglass Cable Tray Systems. Cable Trays are marked with load/span class designations Class A, Class B, or Class C. These class designations represent the static weight supportable by cable tray spans.

Sup Span In. Feet	Working Load In. Lb/Linear Foot		
	Class A	Class B	Class C
20	50	75	100
16	50	75	100
12	50	75	100
8	50	75	100

Listed nonmetallic cable trays are constructed of flame retardant material, provide a degree of voltage isolation, are suitable for use with cables rated a maximum of 2000 V unless marked "SUITABLE FOR USE WITH CABLES RATED A MAXIMUM OF _____ V", are evaluated for the effects of low temperature handling and are suitable for outdoor use unless marked "INDOOR USE ONLY". Unless marked, cable trays are suitable for use with conductors rated 60 C.

Nonmetallic cable trays have not been evaluated for use in air-handling spaces.

The investigation of nonmetallic cable trays does not include the support system.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED", a control number, and the following product name: "Nonmetallic Cable Tray".

CAPACITORS (CYWT)

This listing covers capacitors for **power factor correction** and capacitors for use in fixtures where the ambient temperature does not exceed 70 °C.

The capacitors for power factor correction are for indoor use, unless otherwise indicated.

The basic standard used to investigate products in this category is UL810, "Capacitors".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Power Factor Capacitor", "Capacitor", or other appropriate product name.

CIRCUIT BREAKERS (DHJR)

GENERAL

This category covers circuit breakers which, unless otherwise noted, are of the manually operable, air break type, providing automatic overcurrent protection.

These circuit breakers and circuit breaker enclosures are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and are located on a wiring diagram or in an other readily visible location.

1. Circuit breaker enclosures are marked to indicate the temperature rating of all field installed conductors.
2. Circuit breakers with a current rating of 125 A or less are marked as being suitable for 60°C, 75°C only or 60/75°C rated conductors. It is acceptable to use conductors with a higher insulation rating, if the ampacity is based on the conductor temperature rating marked on the breaker.
3. Circuit breakers rated 125 A or less and marked suitable for use with 75°C rated conductors are intended for field use with 75°C rated conductors at full 75°C ampacity only when the circuit breaker is installed in a circuit breaker enclosure or individually mounted in an industrial control panel with no other component next to it, unless the end-use equipment (panelboard, switchboard, service equipment, power outlet, etc.) is also marked suitable for use with conductors rated 75°C.
4. A circuit breaker with a current rating of more than 125 A is suitable for use with conductors rated 75°C.
5. Circuit breakers intended for continuous operation at 100 percent of rated current may be marked to be connected with 90°C rated wire with the size based on 75°C ampacity.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is to be used with aluminum wire.

ADAPTERS, CIRCUIT BREAKER (DHWZ)

This listing covers equipment designed to adapt circuit breakers to receiving devices such as panelboards, panel base assemblies, etc. and field installation is intended only in those receiving devices which are specifically marked for their use.

For additional information, see Circuit Breakers, Guide DIVQ.

The basic standard used to investigate products in this category is UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Circuit Breaker Adapter".

ADAPTERS, CIRCUIT BREAKER, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DICQ)

This category covers Classified Circuit Breaker adapter kits designed to adapt circuit breakers to receiving devices such as panelboards. The kits and the Listed Circuit breakers furnished with the kits have been investigated and found suitable for use in place of other Listed circuit breakers in specific equipment such as panel boards identified by type and company name in the installation instructions furnished with each kit. A marker is provided for application to the equipment to indicate that the kit and circuit breaker have been installed.

The basic standard used to investigate products in this category is UL 67 "Standard for Panelboards".

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the smallest unit container in which the product is packed, is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

"CIRCUIT BREAKER ADAPTER
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®
FOR USE IN LISTED (MANUFACTURER) PANELBOARDS
AS NOTED IN IL. SHEET _____."

CIRCUIT BREAKER ACCESSORIES (DIHS)

This listing covers accessories such as manual and electrical operators, shunt trip devices, **undervoltage trip devices**, alarm switches and auxiliary switches which are intended for field installation for use only with specific circuit breaker types. Correct combinations of circuit breakers and accessories are indicated by markings on or with the accessory and/or the circuit breaker.

The basic standard used to investigate products in this category is UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product name: "Circuit Breaker Accessory", or the name of the specific product such as "Under Voltage Trip Relay".

CIRCUIT BREAKER AND SECONDARY SURGE ARRESTERS (DIMV)

This listing covers combination circuit breaker and secondary surge arrester devices designed to serve the dual function of providing overcurrent protection, and protection against power-distribution system surge related damage to connected circuits and load connected equipment.

They are intended for installation in circuit breaker enclosures, panelboards and the like on grounded 60 HZ alternating current power circuits in accordance with the National Electrical Code.

For additional information see Molded Case Circuit Breakers (DIVQ) and Surge Arresters (OWHX).

The basic Standard used to investigate the circuit breaker portion is UL489, "Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures". The basic standard used to investigate metal oxide surge arresters is ANSI/IEEE C62.11, "Standard for Metal-Oxide Surge Arresters for AC Power Circuits". All other types of surge arresters are investigated to IEEE C62.1-1989, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products

includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Circuit Breaker and Secondary Surge Arrester".

CIRCUIT BREAKER AND TRANSIENT VOLTAGE SURGE SUPPRESSORS (DIPJ)

This Listing covers combination circuit breaker and transient voltage surge suppressor devices designed to serve the dual function of providing overcurrent protection, and are intended to limit the maximum amplitude of transient voltage surges on power lines to specified values. They are not intended to function as Surge Arresters.

The transient voltage surge suppressors have been tested to verify that transient voltage surges are limited to the maximum amplitudes specified by the manufacturer when subjected to a 1.2 by 50 microsecond 6 kV voltage pulse.

The effect of the suppressor on connected loads, the effect of the suppressor on harmonic distortion of the supply voltage and the adequacy of the suppression level to protect connected equipment from damage from transient voltage surges have not been evaluated.

These devices are intended for installation in circuit breaker enclosures, panelboards and the like on grounded 60 Hz alternating current systems in accordance with the National Electrical Code.

For additional information see Molded Case Circuit Breakers (DIVQ) and Transient Voltage Surge Suppressors (XUHT).

The basic Standard used to investigate the circuit breaker portion is UL 489, "Standard for Molded-Case Circuit Breaker, Molded-Case Switches and Circuit Breaker Enclosures". The basic standard used to investigate the transient voltage surge suppressor is UL 1449, Standard for Transient Voltage Surge Suppressors.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Circuit Breaker and Transient Voltage Surge Suppressor".

CIRCUIT BREAKER CURRENT LIMITERS (DIRW)

Circuit breaker current limiters are designed to be used in conjunction with specific circuit breakers and to be directly connected to the load terminals of the circuit breakers. They contain fusible elements which function only to increase the fault current interrupting ability of the combination which is intended for use in the same manner as circuit breakers when installed at the service and as branch circuit protection. The limiters are rated 600 v or less.

The fusible elements in circuit breaker current limiters are so coordinated that they function at currents below those specified in short circuit test requirements for circuit breakers. Except for this feature of short circuit operation, combinations of circuit breakers and circuit breaker current limiters meet all requirements applicable to branch circuit and service circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating, and circuits of 1000 amps or less regardless of amp rating, without causing operation of the fusible elements in the current limiter. For additional information see Circuit Breakers.

Circuit breaker current limiters are marked to indicate the breakers with which they are intended to be used.

Circuit breaker current limiters which are marked "Current Interrupting Rating(s), MAXIMUM RMS SYM. AMPERES _____ VOLTS _____" have been investigated in conjunction with the circuit breaker and found suitable for the marked interrupting rating.

An interrupting rating on a circuit breaker current limiter included in a piece of equipment does not automatically qualify the equipment in which the combination is installed for use on circuits with higher available currents than the rating of the equipment itself.

The combination of circuit breaker and circuit breaker current limiter is intended to be mounted in listed enclosures.

Equipment (such as panelboards, service equipment, and dead front switchboards) which has been investigated and found suitable for use with the combination of circuit breaker current limiter and circuit breaker is marked to indicate that both may be used.

Circuit breaker current limiters as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings shall be independent of any marking on terminal connectors and shall be readily visible.

Unless the circuit breaker current limiters is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less, and the use of 75 C wire for higher amp rated circuits.

The basic standard used to investigate products in this category is UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Circuit Breaker Current Limiter".

CIRCUIT BREAKERS FOR USE IN COMMUNICATIONS EQUIPMENT (DITT)

These are DC rated circuit breakers intended to provide branch circuit protection in communications circuits.

The acceptability of circuit breakers at 100% of the ampere rating is determined in the end-product.

Circuit breakers that may be used in ambient at temperatures other than 25 C are marked with either a maximum ambient temperature or a range of temperatures.

These circuit breakers have not been investigated for use on motor circuits.

The basic standard use to evaluate these circuit breakers is the Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, UL-489, as modified by the Outline of Investigation for Circuit Breakers for Use in Communications Equipment.

For additional information see DHJR.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Circuit Breaker for Use in Communication Equipment", "Communications Equipment Circuit Breaker", "Circuit Breaker for Use in Communications Equipment", "Communication Equipment Circuit Breaker", "COMM. EQUIP. CIR. BKR.", or "CIR. BKR. FOR USE IN COMM. EQUIP."

CIRCUIT BREAKERS, MOLDED-CASE AND CIRCUIT BREAKER ENCLOSURES (DIVQ)

PRODUCT TYPE

This category covers circuit breakers specifically designed to provide service-entrance, feeder or branch circuit protection and also covers circuit breaker enclosures. They are covered by the classifications indicated by the label designations as follows:

"Circuit Breaker" – without enclosure, and with noninterchangeable trip units.

"Circuit Breaker Frame" – frame only of circuit breaker with provision for interchangeable trip units. A labeled "Circuit Breaker Frame" is Listed for use only with labeled "Circuit Breaker Trip Unit."

"Circuit Breaker Trip Unit" – trip unit only of circuit breaker having provision for interchangeable trip units.

"Circuit Breaker Enclosure" – enclosure only for individual 1-, 2- or 3-pole circuit breaker or for two single-pole breakers not interconnected.

"Replacement Circuit Breaker" – a present design with external modifications to permit its mounting in place of obsolete designs of the same manufacturer in previously listed applications such as panelboards, switchboards and the like, which are still in service.

USE

Listed circuit breakers are intended for use in Listed enclosures, or as part of other Listed equipment, or without enclosures where acceptable.

Listed circuit breakers are rated 600 V or less. A circuit breaker is marked AC or DC or both AC and DC. A symbol (~), where used, represents AC. The frequency is included if other than 60 Hz.

The UL evaluation of a Listed "replacement circuit breaker" involves only the circuit breaker and associated parts; the end application or any series combination application have not been evaluated.

For additional information, see Circuit Breakers (DHJR).

CLASS CTL

Class CTL circuit breakers may be identified by the words "Class CTL" or "CTL" on the circuit breaker as part of the marking.

Class CTL circuit breakers have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more circuit breaker poles than the number for which the assembly is designed and rated.

Some circuit breakers are not provided with a means to prevent their installation in Class CTL assemblies. These circuit breakers are for use in old style, non-Class CTL equipment and are marked "For Replacement Use Only, Not CTL Assemblies."

SWITCHING TYPE

Circuit breakers marked "SWD" are suitable for switching 120, 277 or 347 V fluorescent lighting on a regular basis at their rated voltage.

Circuit breakers marked "HID" have been evaluated for switching high intensity discharge lighting loads on a regular basis at rated voltage.

ISOLATED POLE TYPE

Three pole circuit breakers having provision for two poles to be connected to a bus structure and a third isolated pole (commonly referred to as Delta breakers) are marked "For Replacement Use Only."

Some circuit breakers include a pole intended to disconnect the grounded circuit conductor of a branch circuit. All poles of these circuit breakers open simultaneously.

DISCONNECT CONSIDERATIONS

Single pole circuit breakers rated 120 V ac are suitable for use on circuits rated 120 V to ground.

Single pole or multipole independent trip circuit breakers rated 120/240 V ac, with or without handle ties, are suitable for use in a single-phase multiwire circuit on line to neutral connected loads.

Single pole of multipole independent trip circuit breakers rated 120/240 V ac, with handle ties, are suitable for use on multiwire circuits with line to line or line to ground connected loads.

Two-pole independent trip breakers and single-pole breakers with handle ties, rated 120/240 V ac are suitable for use in line to line single-phase circuits or line to line lighting and appliance branch circuits connected to 3-phase, 4-wire systems, provided the systems have a grounded neutral and the voltage to ground does not exceed 120 V.

Two-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V dc are suitable for use in line to line connected 3-wire dc circuits supplied from a system with a grounded neutral where the voltage to ground does not exceed 125 V.

Two-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V (both ac and dc) are suitable for use in accordance with either of the above two paragraphs, as applicable.

Some independent trip circuit breakers are marked "independent trip," "no common trip" or with equivalent wording.

Multipole common trip circuit breakers rated 120/240 V ac are suitable for use in a single phase multiwire circuit with or without the neutral connected to the load where the voltage to ground does not exceed 120 V.

Multipole common trip circuit breakers rated 125/250 V or 125/250 V dc are suitable for use in a single phase and a dc multiwire circuit with or without the neutral connected to the load where the voltage to ground does not exceed 125 V.

TEMPERATURE

Circuit breakers, the performance of which may be affected by a 40 C ambient temperature within the enclosure and have been evaluated for this application, are marked "40 C."

MAXIMUM LOAD

Unless otherwise marked, circuit breakers should not be loaded to exceed 80 percent of their current rating, where in normal operation the load will continue for 3 hours or more.

INTERRUPTING RATING

Circuit breakers that have an interrupting rating higher than 5000 amps are marked to indicate the higher rating(s).

An interrupting rating on a circuit breaker included in a piece of equipment does not automatically qualify the equipment in which the circuit breaker is installed for use on circuits with higher available currents than the rating of the equipment itself.

GROUND-FAULT TRIP ELEMENTS

Some circuit breakers include a ground fault trip element. These ground fault trip elements have been evaluated in accordance with the requirements of UL 1053 and they are suitable for providing ground-fault protection of equipment in accordance with Sections 215-10, 230-95 or 240-13 of the NEC.

Circuit breakers with ground fault elements intended for use in accordance with NEC Articles 426 or 427 are Listed as Circuit Breakers with Equipment Ground Fault Protection. For additional information, see Circuit Breakers with Equipment Ground Fault Protection (DIYA).

USE IN MOTOR CIRCUITS

Circuit breakers are tested under overload conditions at six times rating to cover motor circuit applications and are suitable for use as motor circuit disconnects per Section 430-109 of the National Electrical Code.

ACCESSORY DEVICES

A circuit breaker that includes an accessory device, whether attached to the circuit breaker by the manufacturer of the circuit breaker, or, by others, is marked to indicate the presence of that accessory.

Where the accessory is a shunt trip device that is suitable for operation with ground fault sensing and relaying equipment, such suitability is indicated in the marking of the circuit breaker.

SPECIAL USES

Two-pole circuit breakers which are suitable for controlling three-phase, corner grounded delta circuits are marked "1 ϕ - 3 ϕ " to indicate their suitability.

Three-pole circuit breakers are suitable for use only on three-phase systems unless marked to indicate otherwise.

Circuit breakers rated 50 A or less and 125/250 V or less are evaluated for use with tungsten-filament lamp loads.

MOUNTING POSITION

Listed circuit breakers may be mounted in any position unless marked to indicate otherwise. If, however, the circuit breaker is mounted so that the handle is operated vertically rather than rotationally or horizontally, the up position of the handle is to be the "on" position.

LINE-LOAD CONNECTIONS

Line and load markings on a circuit breaker are intended to limit connections thereto as marked.

ENCLOSURES

Circuit breaker enclosures that are suitable for use as service equipment are marked accordingly.

Circuit breaker enclosures marked for service equipment use may also be used to provide the main control and means of cutoff for a separately derived system or a second building.

Circuit breaker enclosures identified with an enclosure type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Circuit breaker enclosures that have a short circuit current rating are marked accordingly.

NAVAL AND MARINE USE

Circuit breakers that have been investigated and found suitable for application aboard noncombatant and auxiliary naval ships are marked "Naval."

The Marine Listing Mark identifies those circuit breakers that have been investigated and found suitable for use in a marine environment.

For additional information, see Circuit Breakers, Molded-case and Circuit Breaker Enclosures, Marine (DKTY) in the Marine Products Directory.

Some circuit breakers are intended to be used with uninterruptible power supplies (UPS) with 2- or 3- poles connected in series. These circuit breakers are marked with both the maximum and nominal DC voltage of the system where use is intended, a wiring diagram showing the proper connections of the poles in series, and the statement that these DC ratings are applicable only with UPS.

HACR TYPE

Circuit breakers which have been found suitable for use with heating, air conditioning and refrigeration equipment comprising multimotor or combination loads are marked "HACR TYPE" in conjunction with the Listing Mark. Such circuit breakers are suitable for use with heating, air conditioning and refrigerating equipment marked for use with HACR Type circuit breaker. Use of these circuit breakers with heating, air conditioning and refrigerating equipment is limited to installations where the equipment is marked as suitable for use with any properly sized circuit breaker, or is marked for use with an HACR Type circuit breaker, or is not limited by any marking as to the type of branch circuit, short-circuit and ground-fault protective device.

CURRENT LIMITING

A current limiting circuit breaker is one that does not employ a fusible element and that when operating within its current limiting range, limits the let through I^2t to a value less than the I^2t of a 1/2 cycle wave of the symmetrical prospective current.

Current limiting circuit breakers are marked "current limiting" and are marked either to indicate the let through characteristics or to indicate where such information may be obtained.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 489, "Molded-case Circuit Breakers, Molded-case Switches, and Circuit Breaker Enclosures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Circuit Breaker," "CTL Circuit Breaker," "Circuit Breaker Frame," "Circuit Breaker Trip Unit," "Circuit Breaker Enclosure" or "Replacement Circuit Breaker." The words "Circuit Breaker" may be abbreviated "C.B." in all of the product names permitted above (e.g., "C.B. Enclosure").

Circuit Breakers, Molded-case, Naval Use (DIWA)

USE

This category covers circuit breakers that have been evaluated and found suitable for application aboard noncombatant and auxiliary naval ships.

These circuit breakers are intended for use in enclosures and are rated up to 6000 A, 600 V AC.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers, Molded-case and Circuit Breaker Enclosures (DIVQ), Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 489, "Molded-case Circuit Breakers and Circuit Breaker Enclosures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Circuit Breaker," "CTL Circuit Breaker," "Circuit Breaker Frame" or "Circuit Breaker Trip Unit." The words "Circuit Breaker" may be abbreviated "C.B." in all of the product names permitted above (e.g. "C.B. Enclosure").

CIRCUIT BREAKERS, MOLDED-CASE, CLASSIFIED FOR MITIGATING THE EFFECTS OF ARCING FAULTS (DIWL)

This category covers Listed molded case circuit breakers which are also Classified in that they have been investigated for the ability to mitigate the effects of arcing faults that may pose risk of fire ignition under certain conditions if the arcing persists.

These devices have been tested using methods that create or simulate arcing conditions to determine their ability to recognize and react to arcing faults. The test methods used to evaluate these devices include the carbonized path arcing and point contact arcing test. Tests have also been conducted to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

These devices have been evaluated to determine resistance to unwanted tripping because of the presence of arcing that occurs in control and utilization equipment under normal operating conditions or a loading condition which closely mimics an arc fault, such as the current waveform produced by some solid-state loads.

These circuit breakers are rated 120 or 120/240 volts, 15 or 20 amperes.

These circuit breakers are also Listed and are intended to be used in panelboards or the like marked for their use.

For additional information see the Guide Information for Molded-Case Circuit Breakers and Circuit Breaker Enclosures (DIVQ) and the General Information Section of the Guide for Circuit Breakers (DHJR).

The basic standard used to investigate products in this category is UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures". Other tests, as noted above, are conducted to evaluate the ability of the Classified circuit breakers to detect and respond to arcing faults.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking appears on the device in addition to the Listing Mark described under the Guide Information for Molded Case Circuit Breakers and Circuit Breaker Enclosures (DIVQ).

The Classification Marking consists of the Listing Mark and the statement:

ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR MITIGATING THE EFFECTS OF ARCING FAULTS

CIRCUIT BREAKERS, MOLDED-CASE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DIXF)

GENERAL

This category covers Classified molded-case circuit breakers rated 15 to 50 A, 120/240 V maximum that have been investigated and found suitable for use in place of other Listed circuit breakers in specific Listed panelboards. The circuit breakers are Classified for use in specified panelboards in accordance with the details described on the circuit breaker or in the publication provided therewith.

In addition, Classified molded-case circuit breakers may also be Listed with additional features such as a ground-fault trip element, ground-fault circuit interrupter, arc-fault circuit interrupter, secondary surge arrester, transient voltage surge suppressor, and the like.

PRODUCT MARKINGS

A circuit breaker that is Classified only is marked on the side with the statement:

"Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac or less. Do not use in equipment connected to circuits having an available system short-circuit

current in excess of 10 kA, 120/240 volts ac. For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. _____ provided with this circuit breaker. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."

A circuit breaker that is both Classified and Listed is marked on the side with the statement:

"This circuit breaker is Listed for use in circuit breaker enclosures and panelboards intended and marked for its use. This circuit breaker is Classified for use, where the available short-circuit current is 10 kA, 120/240 V ac or less, in the compatible panelboards shown in Publication No. _____ provided with this circuit breaker. When used as a Classified circuit breaker, do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 V ac. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."

The referenced publication is a compatibility list which tabulates the company name, catalog number, number of poles and electrical ratings of the Classified circuit breaker, in addition to the company name and catalog number of the applicable UL Listed panelboards, and corresponding UL Listed circuit breakers in place of which the Classified circuit breaker has been investigated. The compatibility list also details the maximum permissible voltage and maximum available short circuit current of the supply system to the panelboard. The Classified circuit breaker is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each circuit breaker.

Circuit breakers which are both Classified and Listed have markings as above, with the addition of the Listing Mark, located on the side of the circuit breaker.

RELATED PRODUCTS

For information on markings, see Molded-case Circuit Breakers and Circuit Breaker Enclosures (DIVQ) and Circuit Breakers (DHJR). For those Classified molded-case circuit breakers containing additional features, refer to the following categories: for Arc Fault Circuit Interrupters, Branch/Feeder Type, see AVZQ; for Circuit Breaker and Secondary Surge Arresters, see DIMV; for Circuit Breaker and Transient Voltage Surge Suppressors, see DIPJ; for Circuit Breakers with Equipment Ground Fault Protection, see DIYA; for Circuit Breaker and Ground-fault Circuit Interrupters, see DKUY.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures" and UL 67, "Panelboards."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark appears on the side of the circuit breaker and consists of the words "Underwriters Laboratories Inc. Classified Circuit Breaker" together with a control number. The words "Underwriters Laboratories Inc." may be abbreviated "Underwriters Lab. Inc." or "Und. Lab. Inc."

The following mark:  appears on the front, visible surface of the circuit breaker.

CIRCUIT BREAKERS WITH EQUIPMENT GROUND FAULT PROTECTION (DIYA)

USE AND INSTALLATION

This category covers combination circuit breaker and equipment ground fault protective devices designed to serve the dual function of providing overcurrent protection, and ground fault protection for equipment, as required by Articles 426 and 427 of NFPA 70, "National Electrical Code" (NEC).

A circuit breaker and equipment ground fault device is intended to be installed only on grounded alternating current systems in accordance with the NEC.

(1) These devices are intended to be installed in new or existing panelboards or the like.

(2) The equipment ground fault protection trip level is marked on the devices.

(3) These devices are suitable for use on systems where the voltage does not exceed the rating on the device.

(4) A two-wire device is not suitable for use in a multiwire branch circuit as defined in the NEC.

(5) These devices are marked so that they can be distinguished from a circuit breaker and ground fault circuit interrupter.

(6) These devices may have any voltage rating that is acceptable for a circuit breaker.

RELATED PRODUCTS

See Circuit Breakers, Molded-case and Circuit Breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures" and UL 1053, "Ground-Fault Sensing and Relaying Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker With Equipment Ground Fault Protection" or the abbreviation "C.B. W/EQ.GFP."

FUSED CIRCUIT BREAKERS (DIYV)

Fused circuit breakers include all the mechanical features of molded-case circuit breakers and in addition have one or more replaceable current limiters or fuses which function to increase the fault current interrupting ability. They are intended to be used in the same manner as other circuit breakers when installed at the service and as branch circuit protection and are to be mounted in Listed enclosures. Fused circuit breakers are identified with respect to their performance characteristics as either Type 1 or Type 2. They are rated at 600 volts or less.

Type 1 fused circuit breakers meet all performance requirements of molded-case circuit breakers. The fuse, fuses, or replaceable current limiters function only to extend the fault current interrupting rating beyond the short circuit test requirement applicable. Type 1 devices are limited to constructions which are designed to accommodate and coordinate with fuses or replaceable current limiters having high interrupting capacity ratings.

Type 2 fused circuit breakers use a fuse, fuses or current limiters so coordinated that they function at currents below those specified in short circuit test requirements. Except for this feature of short circuit operation Type 2 fused circuit breakers meet all requirements applicable to molded-case circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating, and circuits of 1000 amps or less regardless of amp rating, without causing operation of the fuse, fuses or current limiters which are a part of the device. Type 2 devices are limited to constructions which are designed to accommodate and coordinate with fuses having high interrupting capacity ratings.

For additional information see Circuit Breakers.

The basic standard used to investigate products in this category is UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures".

The Listing Mark of Underwriters Laboratories Inc. on or associated with the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Fused Circuit Breaker", "Fused Circuit Breaker Frame".

CIRCUIT BREAKER AND GROUND-FAULT CIRCUIT INTERRUPTERS (DKUY)

This listing covers combination circuit breaker and ground fault circuit interrupter devices designed to serve the dual function of providing over-current protection, and protection against shock hazard, as required by the National Electrical Code ANSI/NFPA 70.

A circuit breaker and ground-fault circuit interrupter is intended to be installed only on grounded 60 hertz alternating current systems in accordance with the National Electrical Code.

(1) These devices are intended to be installed in new or existing service equipment, panelboards and the like.

(2) These devices are categorized by a lettered Class designation such as Class A, to assure proper coordination with certain utilization equipment such as underwater swimming pool fixtures.

(3) A two-wire device is not suitable for use in a multiwire branch circuit as defined in the National Electrical Code.

(4) Some devices rated 120/240V do not have a load neutral wire connector and are intended for use with 208 volt or 240 volt loads only.

For additional information see Molded-Case Circuit Breakers and Circuit Breaker Enclosures, and Ground-Fault Circuit Interrupters.

The basic standards used to investigate products in this category are UL489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures" and UL943, "Ground-Fault Circuit Interrupters".

The listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Circuit Breaker and Ground-Fault Circuit Interrupter" or "C.B./GFCI".

CIRCUIT BREAKER AND GFCIS CLASSIFIED FOR MITIGATING THE EFFECTS OF ARCING FAULTS (DKWV)

This category covers Listed circuit breaker and ground fault circuit interrupters which are also Classified in that they have been investigated for the ability to mitigate the effects of arcing faults that may pose risk of fire ignition under certain conditions if the arcing persists.

These devices have been tested using methods that create or simulate arcing conditions to determine their ability to recognize and react to arcing faults. The test methods used to evaluate these devices include the carbonized path arcing and point contact arcing test. Tests have also been conducted to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

These devices have been evaluated to determine resistance to unwanted tripping because of the presence of arcing that occurs in control and utilization equipment under normal operating conditions or a loading condition which closely mimics an arc fault, such as the current waveform produced by some solid-state loads.

These circuit breakers are rated 120 or 120/240 volts, 15 or 20 amperes.

These circuit breakers are also Listed and are intended to be used in panelboards or the like marked for their use.

For additional information see the Guide Information for Circuit Breaker and Ground Fault Circuit Interrupters (DKUY).

The basic standards used to investigate products in this category are UL-489, "Molded-Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures" and UL-943, "Ground-Fault Circuit Interrupters". Other tests, as noted above, are conducted to evaluate the ability of the Classified circuit breakers to detect and respond to arcing faults.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking appears on the device in addition to the Listing Mark described under the Guide Information for Circuit Breaker and Ground-Fault Circuit Interrupters (DKUY).

The Classification Marking consists of the Listing Mark and the statement:

**ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR MITIGATING THE EFFECTS OF ARCING FAULTS**

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 V (DLAH)

GENERAL

This category covers indoor medium-voltage ac power circuit breakers rated over 600 V and the metal-clad switchgear in which they are intended to be installed. The term "indoor" does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended to provide service entrance, feeder or branch circuit overcurrent protection, serve as a disconnecting means, or both. These devices are intended for installation in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code."

CIRCUIT BREAKERS

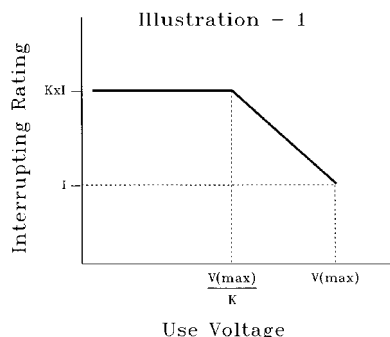
The circuit breakers are three-pole devices of the draw-out type, are trip-free and may be either air break or vacuum-type devices.

Circuit Breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a "close-and-latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amps. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amps that is applicable at the maximum rated voltage. These circuit breakers are also provided with a "K" factor for determining the interrupting rating at a use voltage lower than the maximum rated volt-

age. The circuit breaker may interrupt a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max" by the same factor, or at a lower voltage, as depicted in Illustration 1.



Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

METAL-CLAD SWITCHGEAR

Metal-clad switchgear may consist of one or two compartments in a vertical section. A compartment may be intended to house a circuit breaker, or it may be designated an auxiliary compartment. An auxiliary compartment may typically contain potential transformers, control gear, protective relays and the like. Vertical sections may consist of a single freestanding section or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

Current sensors are factory installed and may be mounted on the circuit breaker or on the line or load bus within the metal-clad switchgear. The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically located on the door of the circuit breaker compartment or in an auxiliary compartment.

Metal-clad Switchgear Ratings

Metal-clad switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Listing Mark.

GROUND AND TEST DEVICES

A ground and test device is a switchgear accessory device that can be inserted in place of a draw-out circuit breaker for the purpose of (1) grounding the main bus and/or external circuits connected to the switchgear assembly and/or (2) primary circuit testing.

A ground and test device is marked with the manufacturer's name, a type designation, electrical ratings, primary disconnecting devices compartment compatibility and an instruction manual number.

ENCLOSURES

An enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." Enclosures may be either nonventilated or ventilated. Enclosures are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ARC-RESISTANT SWITCHGEAR

Metal-clad switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear has been evaluated for installation in buildings (for indoor applications) that have sufficient overhead space to permit venting without reflecting arc products, as specified in the installation instructions.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C, or I, II or III based upon the construction and the standard used for the evaluation.

Type A or I designates switchgear with arc-resistant construction at the front only.

Type B or II designates switchgear with arc-resistant construction at the front, back and sides.

Type C or III designates switchgear with arc-resistant construction at the front, back and sides and between compartments within the same cell or adjacent cells.

In Type C or III equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate circuit breakers and metal-clad switchgear in this category are ANSI C37.20.2-1987, "Metal-clad and Station-type Cubicle Switchgear," ANSI C37.54-1987, "Indoor Alternating-current High-voltage Circuit Breakers Applied as Removable Elements in Metal-clad Switchgear Assemblies - Conformance Test Procedures" and ANSI C37.55-1989, "Metal-clad Switchgear Assemblies - Conformance Test Procedures."

The basic requirements used to investigate ground and test devices in this category are contained in proposed IEEE Standard for Medium-Voltage Ground and Test Devices for Use in Metal-Clad Switchgear, C37.20.6, Draft 12 dated 10/10/94.

The basic standards used to investigate switchgear Classified as "arc resistant" are the Procedure for Testing the Resistance of Metal-Clad Switchgear under Conditions of Arcing Due to an Internal Fault, EEMAC G14-1, 1987 or, the Guide for Testing Metal-Enclosed Switchgear for Internal Arcing Faults, IEEE C37.20.7-19XX, Draft 3 or, A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 72.5 kV, IEC 298 Annex AA, as indicated in the Classification Mark.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Medium Voltage AC Power Circuit Breaker," "Metal-clad Switchgear," "Metal-clad Switchgear Enclosure" or "Ground and Test Device."

Classification Mark for Arc-resistant Switchgear

The Classification Mark of Underwriters Laboratories Inc. on switchgear evaluated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

The Classification Mark consists of the appropriate Listing Mark (noted above) and the following additional information:

**ARC RESISTANT SWITCHGEAR
ALSO CLASSIFIED IN ACCORDANCE WITH
(designation of standard and date)**

CIRCUIT BREAKERS, MEDIUM VOLTAGE CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DLBC)

This category covers circuit breakers of current design that have been modified to replace obsolete circuit breakers.

These circuit breakers are intended to be installed in switchgear where the exact replacement is no longer available.

The ratings on the circuit breaker apply unless the ratings on the host switchgear are lower. In either case the lower rating is applicable.

For additional information see the Guide Information for Circuit Breakers and Metal — Clad Switchgear — Over 600 Volts (DLAH).

In addition to other required markings, these circuit breakers are marked to indicate the Type of switchgear where they are intended to be used.

The basic standards used to evaluate these circuit breakers are ANSI C37.20.2 — 1987, Metal — Clad and Station — Type Cubicle Switchgear, ANSI C37.54 — 1987, Indoor Alternating — Current High — Voltage Circuit Breakers Applied as Removable Elements in Metal — Clad Switchgear Assemblies — Conformance Test Procedures and ANSI C37.55-1989, Metal — Clad Switchgear Assemblies — Conformance Test Procedures.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking includes the Classified Product symbol  (which must appear on the front, visible surface of the circuit breaker), a control number, and the following statement:

Medium Voltage Circuit Breaker
Classified By
Underwriters Laboratories Inc.®
For Use With

(Company Name) Type _____ Switchgear Only

In the Classification Marking, the words "Underwriters Laboratories Inc." may be abbreviated to "Underwriters Lab. Inc." or "Und. Lab. Inc."

CIRCUIT BREAKER SWITCHGEAR, METAL-ENCLOSED, OVER 600 V (DLBK) GENERAL

This category covers indoor medium voltage ac power circuit breakers rated over 600 V and the metal-enclosed switchgear in which they are installed. The term "indoor" does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended to provide overcurrent protection. The circuit breakers are supplemented by a series-connected switch that can ground the load circuit and serves as a disconnecting means.

The circuit breakers are three-pole devices of the stationary type, are trip-free and may be either gas insulated or vacuum-type devices.

This equipment is intended for installation in accordance with the requirements of the National Electrical Code, NFPA 70.

CIRCUIT BREAKER RATINGS

Each circuit breaker section is provided with a marking that indicates the voltage and current ratings. This marking also contains a "close and latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amps. Circuit breakers may be rated up to 38 kV and 3150 A.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amps that is applicable at the maximum rated voltage. These circuit breakers may also be provided with a "K" factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. When there is a marked "K" factor, the circuit breaker may interrupt a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max," by the same factor, or at a lower voltage. If there is no marked "K" factor, it is 1.

Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

METAL-ENCLOSED SWITCHGEAR

Metal-enclosed switchgear may consist of one or more vertical sections. Vertical sections may consist of a single freestanding section, or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. A vertical section may be intended to house a circuit breaker and switch or other attendant equipment, or it may be designated an auxiliary section. An auxiliary section may typically contain potential transformers, control gear, protective relays and the like. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Marking.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified and is numbered as part of a line-up.

Current sensors are factory installed. The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically located on the door of the section, in the front compartment of a section, or in an auxiliary compartment.

METAL-ENCLOSED SWITCHGEAR RATINGS

Metal-enclosed switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing a UL Listing Mark.

ENCLOSURES

An enclosure evaluated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." Enclosures may be either non-ventilated or ventilated. Enclosures are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ARC-RESISTANT SWITCHGEAR

Metal-enclosed switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear has been evaluated for installation in buildings (for indoor applications) that have sufficient overhead space to permit venting without reflecting arc products, as specified in installation instructions.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C, or 1, 2 or 3 based upon the construction and the standard used for the evaluation.

Type A or 1 designates switchgear with arc-resistant construction at the front only.

Type B or 2 designates switchgear with arc-resistant construction at the front, back and sides.

Type C or 3 designates switchgear with arc-resistant construction at the front, back and sides and between compartments within the same cell or adjacent cells.

In Type C or 3 equipment, a fault in a main bus bar compartment may propagate into the main bus bar compartments of adjacent feeder cells.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to evaluate circuit breakers and metal-enclosed switchgear in this category are ANSI/IEEE C37.20.3-1987, "Metal-Enclosed Interrupter Switchgear," ANSI C37.57-1990, "Metal-Enclosed Interrupter Switchgear Assemblies — Conformance Testing" and ANSI C37.54-1987, "Indoor Alternating-Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Clad Switchgear Assemblies — Conformance Test Procedures."

The basic standards used to evaluate switchgear Classified as "Arc Resistant" are EEMAC G14-1, 1987, "Procedure for Testing the Resistance of Metal-Clad Switchgear Under Conditions of Arcing Due to an Internal Fault," IEEE C37.20.7-19XX, Draft 15, "Guide for Testing Metal-Enclosed Switchgear for Internal Arcing Faults" or IEC 60298 Annex AA, "A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 72.5 kV" as indicated in the Classification Mark.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark covers only the sections included in the assembly. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-enclosed Circuit Breaker Switchgear."

CLASSIFICATION MARK FOR ARC-RESISTANT SWITCHGEAR

The Classification Mark of Underwriters Laboratories Inc. on switchgear additionally evaluated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the marking.

The Classification Mark consists of the appropriate Listing Mark (noted above) and the following additional information:

ARC-RESISTANT SWITCHGEAR
ALSO CLASSIFIED IN ACCORDANCE WITH
(designation of standard and date)

CIRCUIT PROTECTORS (DLBX)

USE

Circuit protectors are designed for installation in standard Edison-base fuseholders and intended to provide overcurrent protection for services and branch circuits. Circuit protectors are not provided with manual "On" and "Off" switching means, but are provided with a trip-free manual reset to reclose the circuit after automatic opening as a result of overload or short circuit.

Circuit protectors are suitable for use on circuits where the available fault current does not exceed 5000 amps RMS symmetrical.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Protector."

CLEATS, KNOBS AND TUBES (DRLT)

This listing covers porcelain cleats, knobs, and tubes for the support of conductors of open wiring or concealed knob and tube work on circuits involving potentials as follows:

Knobs and tubes, 600 v or less.

Multiple-wire cleats, 300 v or less.

Single-wire cleats, 600 v or less if wires are maintained at least 1 in. from the surface wired over, and 300 v or less if wires are maintained at less than 1 in. but at least 1/2 in. from the surface wired over.

The basic standard used to investigate products in this category is UL 511, "Porcelain Electrical Cleats, Knobs, and Tubes."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Cleat", "Knob", "Tube", or other appropriate product name.

COMMUNICATION CABLE ASSEMBLIES (DUNH)

This Listing covers factory assembled communication cable assemblies that are comprised of Listed Communication Cable and communication cable connectors suitable for the application. They are intended for use in residential and/or commercial applications as connected communication premises wiring. These assemblies are intended for installation in accordance with Article 800 of the National Electrical Code, NFPA70. **Restrictions that apply to the cables used in these assemblies, according to this article, also apply to the complete cable assemblies. The connectors employed in these assemblies have not been evaluated for use under carpet.**

These assemblies have not been evaluated for use in environmental air spaces, in accordance with Section 300-22(b) and (c) of the National Electrical Code, NFPA70 unless specifically marked for the application.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Communication Cable Assembly".

COMMUNICATIONS CABLE (DUZX)

USE AND INSTALLATION

This category covers communications cable which is a single conductor coaxial cable or a multiple conductor jacketed cable for telephone and

other communications circuits for use as described in Article 800 of NFPA 70, "National Electrical Code" (NEC).

This cable is used as wiring from a protector to a telephone or other communications equipment within a building, and for use as interconnecting wiring between parts of a communications system.

Except for special locations specifically required by the NEC, communications cable, in general, is not required to be installed in conduit or raceway.

PRODUCT MARKINGS

Communications cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CM — Indicates cable intended for general use within buildings in accordance with Section 800.53(E)(1) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

CMG — Indicates cable for general use within buildings in accordance with Section 800.53(E)(1) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in UL 1685.

CMP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 800.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5 a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wire and Cables for Use in Air-Handling Spaces."

CMR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CMUC — Indicates cable for undercarpet use in accordance with Section 800.53(E)(6) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

CMX — Indicates cable intended for use within buildings (1) where the wire or cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of wire or cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 800.53(E) of the NEC. Type CMX cable may be marked "Outdoor" to indicate its suitability for installation outdoors on dwellings. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Cable that contains one or more optical fiber members has the suffix "-OF" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "Shielded" contains one or more electromagnetic shields.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Multipurpose cable complies with the requirements for Types CM, CMG, CMP, or CMR and also complies with the requirements as described in Sections 760.71(B) and (I) of the NEC, and has one of the following designations:

MP* — Indicates cable intended for use within buildings in accordance with Section 800.53(E)(1) of the NEC. This cable does not spread flame to the top of the tray when tested in accordance with the requirements of the Vertical-Tray Flame Test in UL 1685.

MPG* — Indicates cable for general use within buildings in accordance with Section 800.53(E) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in UL 1581.

MPP* — Indicates cable that is intended for use within buildings in ducts, plenums or other spaces used for environmental air in accordance with Section 800.53(B) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5.0 ft when tested in accordance with NFPA 262.

MPR* — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53(E)(1) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with UL 1666.

* Types MP, MPR, MPG and MPP cable will no longer be manufactured after July 1, 2003. Cable manufactured before that date continues to be suitable for use in accordance with the NEC Sections shown above.

Listed cable that is additionally marked "Verified (UL) Category 2, 3, 4, 5, 5E or 6 [including latest draft number if applicable]" or "Verified (UL) Category 3, 4, 5, 5E or 6 [including latest draft number if applicable] Patch Cable" for Stranded Conductor Cables, has been evaluated in accordance

with the UL Data Transmission Performance Category Marking Program and is manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked "Verified (UL) Category 6 or 7 NEMA WC66" has been evaluated in accordance with the NEMA WC66 performance standard for category 6 and 7 100 ohm shielded and unshielded twisted pair cable. Additionally, this cable has been manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked "Verified In Accordance With [Specification name and/or number]" complies with the requirements of a transmission performance specification referenced and is manufactured under an acceptable quality assurance system.

Communications wire includes distributing frame wire and cross-connect wire which are single wires or unjacketed multiconductor assemblies of these wires that are intended for use in distributing frames and in cross-connect arrays in accordance with Section 800.53(C) of the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 444, "Communications Cable." In addition, the standards used to investigate cables marked "Verified In Accordance With [Specification]" include the applicable Performance Standards.

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Communications Cable."

Cable Verified to the UL Data Transmission Performance Category Marking Program has the marking "Verified to UL Performance Category Program," together with the Listing Mark information on the tag, reel or smallest unit container; cable Verified to another transmission performance specification has the marking "Verified in Accordance with [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

COMMUNICATIONS CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBG)

DATA TRANSMISSION CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBI)

GENERAL

This category covers data transmission cable whose signal transmission characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with either specification shown below. This cable is not evaluated for use in accordance with NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Performance Specifications:

- A. TIA/EIA 568B, "Commercial Building Telecommunications Cabling." Cables evaluated to this standard bear an assigned "Category" number designation (e.g., Category 3, 4, 5, 5E or 6) to indicate the requirements in the standard in accordance with which the cable was evaluated.
- B. ISO/IEC 11801, "Information Technology – Generic Cabling for Customer Premises for 100 Ohm Cable." Cables evaluated to this standard bear an assigned "Category" number designation (e.g., Category 3, 4 or 5) to indicate the requirements in the standard in accordance with which the cable was evaluated.

Additional data transmission performance specifications may be used by Underwriters Laboratories Inc. in the evaluations based upon industry needs.

UL MARK

The UL symbol with the word "VERIFIED" on the product and the Verification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its

Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Data Transmission Cable" and the Specification name and/or number.

In addition to the marking on the tag, reel or smallest unit container, cables that have been Verified by UL in accordance with the signal transmission characteristics and have not been Listed by UL as Communications Cable, Power-Limited Circuit Cable or other UL Listed Cable, are marked with the statement "Verified by Underwriters Laboratories Inc. in accordance with [Specification name(s) and/or number(s)] Only" in the surface print legend. The UL symbol [either the UL in a circle symbol or "(UL)"] is not used in place of the wording "Underwriters Laboratories Inc." in the statement.

COMMUNITY ANTENNA TELEVISION CABLE (DVCS)

USE AND INSTALLATION

This category covers community antenna television cable for use in accordance with Article 820 of NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

Community antenna television cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CATVP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 820.51(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

CATVR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 820.51(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CATV — Indicates cable intended for general use within buildings in accordance with Section 820.51(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

CATVX — Indicates cable intended for limited use within buildings (1) where the cables are enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) installed in one- or two-family or multifamily dwellings when the cable diameter is less than 0.375 in. in accordance with Section 820.51(D) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Type CATVX was known as "Community Antenna Television Cable" and the cable was so marked.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1655, "Community Antenna Television Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Community Antenna Television Cable."

COMPUTER INTERCONNECTION CABLE ASSEMBLIES (DVPJ)

This listing covers Computer Interconnection Cable Assemblies that are intended for installation between units of electronic equipment where the cables are outside of the equipment enclosure and within the computer

room as defined in Article 645 of the National Electrical Code. These cable assemblies may also be used in an office environment where the cable is visible after installation.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Computer Interconnection Cable Assembly".

CONDUCTOR TERMINATION COMPOUNDS (DVYW)

Conductor termination compounds are for use on splice and termination connections of aluminum, copper-clad aluminum and copper conductors where used to retard oxidation at the conductor/connector interface. These compounds do not have a deleterious effect on the conductor metal, insulation or equipment when used in accordance with the manufacturer's installation instructions.

Reference should be made to the product label located on the smallest unit container for specific instructions as to the proper use of the compound.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Conductor Termination Compound".

CONDUIT AND FITTINGS (DWFV)

CONDUIT AND CABLE HARDWARE (DWMU)

GENERAL

This category covers cable ties, conduit straps, staples, and similar types of hardware for installation in wiring systems in accordance with NFPA 70, "National Electrical Code" (NEC).

The mechanical strength of these products is evaluated with consideration given to the intended installation. Metallic devices are also evaluated for resistance to corrosion, and nonmetallic devices may be evaluated for flammability and exposure to elevated or cold temperatures.

CARTON MARKINGS

The product carton for a metallic construction of any conduit and cable hardware that is intended for use in spaces used for environmental air is marked "Suitable for use in Air-Handling Spaces in accordance with Section 300.22(B), (C) and (D) of the NEC."

The product carton for a construction made of polymeric material of any conduit and cable hardware that is intended for use in spaces used for environmental air is marked "Suitable for use in Air-Handling Spaces in accordance with Section 300.22(C) and (D) of the NEC."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit and Cable Hardware" or other appropriate product name as shown in the individual Listings.

CONDUIT FITTINGS (DWTT)

USE

This category covers metallic and nonmetallic conduit fittings, such as couplings, conduit bodies, short radius conduit bodies, expansion fittings, locknuts and connectors for use in the assembly of nonmetallic and metallic wiring systems. Also covered are fittings used to provide a transition between metallic and nonmetallic wiring systems. All fittings are intended to be installed in accordance with NFPA 70, "National Electrical Code" (NEC), and are intended for installation and use in accordance with the following information and the limitations specified in the appropriate conduit or tubing category. Some of these fittings are also suitable for use in certain hazardous (classified) locations where ordinary locations fittings

are permitted in Articles 501-503 of the NEC. This category also includes metal bushings for use in conduit and insulating bushings for use on conduit inside boxes, gutters, etc.

Conduit Bodies — Conduit bodies that are not provided with a volume marking are not intended to enclose splices, taps or devices. Conduit bodies that are provided with a volume marking are covered under Metallic Outlet Boxes (QCIT) or Nonmetallic Outlet Boxes (QCMZ). Conduit bodies Classified for use with specific conduit body covers and conduit body covers Classified for use with specific conduit bodies are covered under Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW).

Short Radius Conduit Bodies — Short radius conduit bodies, such as capped elbows and service entrance elbows, are not intended to contain splices or taps and are not marked with a volume.

Insulating Bushings — Insulating bushings provided either separately or as part of a fitting are suitable for temperatures of 150°C if they are colored black or brown, and for 90°C if any other color unless specifically marked for a higher temperature.

Volume — Fittings or covers for fittings are intended to be judged to contribute no volume other than the equivalent raceway connected to it unless specifically marked.

Sealing Locknuts — Sealing locknuts are intended for use with threaded rigid metal conduit and intermediate metal conduit with one sealing locknut in the outside or the inside and either an ordinary locknut or sealing locknut on the opposite side of the enclosure for wet locations or liquid-tight applications. Sealing locknuts may also be used with Listed wet location or liquid-tight fittings where so marked on the fitting carton.

CARTON MARKINGS

Fittings for use with electrical metallic tubing (adapters), unthreaded rigid metallic, intermediate metallic conduit or threaded couplings which split to fit over the ends of threaded rigid metal or intermediate metal conduit and then are bolted in place have been tested only for use with steel conduit or tubing unless marked on the fitting or carton to indicate suitability for use with aluminum or other material.

A fitting that is taped completely (from the raceway to the box or raceway to raceway) is concrete-tight when the product carton is marked with "CONCRETE-TIGHT WHEN TAPED."

Fittings for use with flexible metal conduit have been tested only for use with the type of conduit marked on the carton. The carton may be marked "FMC" for all four types of flexible metal conduit, or may also be marked "FE," "AL," "FERW" or "ALRW" in any combination for any combination of the four types of flexible metal conduit.

Threadless conduit fittings suitable for use in concrete or where exposed to the weather are identified by a marking on the carton. Aluminum fittings are not considered suitable for use in concrete or cinder fill unless protected with an asphalt paint or the equivalent.

All liquid-tight fittings are identified on the carton as "Liquid-Tight." The term "Liquid-Tight" on the carton indicates suitability for use where directly exposed to oil spray or to rain.

Metallic fittings for use with liquid-tight flexible metal and nonmetallic Type-B conduit are identified with the carton marking "Liquid-Tight Flexible Metal Conduit" and "FNMC-B or LFNC-B."

Fittings identified with an enclosure type designation or as rain-tight or liquid-tight on the carton are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Connectors that are also suitable for use with power and control tray cable, nonmetallic sheathed cable, service entrance cable, or flexible non-metallic tubing are so identified by the appropriate marking on the carton. Connectors designated "For Use with Nonmetallic Sheathed Cable" are also suitable for use with multiconductor underground feeder and branch circuit cable where used in dry locations. Unless marked otherwise on the carton, the connectors are suitable for connection of only one cable per cable entry.

GROUNDING

All metal fittings for metal cable, conduit and tubing are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC, except as noted for flexible metal conduit fittings and liquid-tight flexible metal conduit fittings.

FITTINGS

Flexible Metal Conduit Fittings — Flexible metal conduit fittings designed for connection to the conduit by clamping around the circumference of the conduit are considered suitable for grounding for use in circuits over and under 250 V and when used in accordance with the NEC and containing conductors protected by overcurrent devices rated 20 A or less. Flexible metal conduit fittings of types other than the clamping type mentioned previously in the 3/8 through 3/4 in. trade size and containing conductors protected by overcurrent devices rated 20 A or less are considered suitable for grounding when used in accordance with the NEC. All other trade sizes that have been investigated for grounding are marked "GRND" or the equivalent.

Liquid-tight Flexible Metal Conduit Fittings — Liquid-tight flexible metal conduit fittings in the 1-1/4 in. and smaller trade sizes are consid-

ered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

Liquid-tight Flexible Nonmetallic Conduit Fittings — Liquid-tight flexible nonmetallic conduit fittings for Type-A conduit are marked "FNMC-A or LFNC-A Only." Fittings for Type-B conduit are marked "FNMC-B or LFNC-B Only." Fittings for Type-C conduit are marked "FNMC-C or LFNC-C Only."

Nonmetallic Fittings — Nonmetallic fittings suitable for use with rigid nonmetallic conduit are identified by the appropriate marking on the carton. Such fittings are inherently resistant to atmospheres containing industrial corrosive agents and will also withstand vapors or mists of caustic, pickling, acids, plating baths, hydrofluoric, and chromic acids. Fittings that have been investigated for exposure to other reagents may be identified by the designation "Reagent Resistant" printed on the surface of the fittings. Such special uses are described in greater detail in the individual carton markings or instructions packed with the device. Nonmetallic fittings for use with rigid PVC conduit are suitable with wires rated 90°C or less.

Threadless Fittings — Threadless fittings for use with electrical metallic tubing, rigid metal conduit, intermediate metal conduit or threaded couplings which split to fit over the ends of threaded rigid metal or intermediate metal conduit and then are bolted in place are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

Additional Fittings — For additional Listings of conduit fittings, see Outlet Bushings and Fittings (QCRV), Insulating Bushings (NZMT), Rigid Ferrous Metal Conduit (DYIX), Intermediate Ferrous Metal Conduit [for elbows] (DYBY) and Armored Cable Connectors [for connectors which may also be suitable for use with flexible cord, flexible metal conduit and metal clad (Type MC) cable] (AWSX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Conduit Fitting," "Adapter," "Coupling" or other appropriate product name as shown in the individual Listings.

CONDUIT, RIGID NONMETALLIC, UTILITY SPECIFICATION (DWVJ)

This listing covers Rigid Nonmetallic Conduit, including elbows and bends, intended for utility company installations and similar uses not within the scope of the National Electrical Code (NEC).

The basic standard used to evaluate products in this category is UL651, with variations as identified in the utility company or other specification indicated in the individual listings. This specification is marked on the products. The products are intended for installation as specified by the acceptance authority.

Fittings listed under Conduit Fittings (DWTT) for schedule 40 rigid non-metallic conduit are suitable for use with conduit listed under this category.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Utility Specification Rigid Nonmetallic Conduit." In addition, the specific name and specification, such as "Kw Power Company Specification PVC-3," is appended to the product name or substituted for the words "Utility Specification" in the product name.

FLEXIBLE CONDUIT, LIQUID-TIGHT (DWWY)

This category covers flexible liquid-tight conduit intended for use in wet locations or where exposed to mineral oil, both at a maximum temperature of 60°C and installed in accordance with the National Electrical Code, NFPA 70. It is not intended for direct burial or where exposed to gasoline or similar light petroleum solvents unless so marked on the product.

Flexible Metal Conduit Assemblies, Liquid-tight (DXAS)

This listing includes liquid-tight flexible metal conduit, in trade sizes 3/8 - to 4 in., incl., for installation in accordance with Article 351 of the National Electrical Code for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits in accordance with Article 430, and for electric signs and outline lighting in accordance with Article 600.

Liquid-tight flexible metal conduit assemblies consist of a length of liquid-tight metal conduit terminated at each end with a permanently attached connector.

Liquid-tight flexible metal conduit assemblies are suitable for use in certain hazardous locations as permitted in Articles 501-503 of the NEC.

Liquid-tight flexible metal conduit assemblies are sunlight resistant and suitable for use outdoors.

Where terminated in fittings investigated for grounding and where installed with not more than 6 ft (total length) in any ground return path, liquid-tight flexible metal conduit in the 3/8 and 1/2 in. trade sizes is suitable for grounding where used on circuits rated 20 amps or less and the 3/4, 1 and 1-1/4 in. trade sizes are suitable for grounding where used on circuits rated 60 amps or less.

The following are not considered to be suitable as a grounding means:

- 1) The 1-1/2 in. and larger trade sizes.
- 2) The 3/8 and 1/2 in. trade sizes where used on circuits rated higher than 20 amps or where the total length in the ground return path is greater than 6 ft.
- 3) The 3/4, 1 and 1-1/4 in. trade sizes where used on circuits rated higher than 60 amps, or where the total length in the ground return path is greater than 6 ft.

The basic standards used to investigate products in this category are UL360, "Liquid-Tight Flexible Steel Conduit, Electrical" and UL514B, "Fittings for Conduit and Outlet Boxes".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and/or Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Liquid-Tight Flexible Metal Conduit Assembly".

Flexible Metal Conduit, Liquid-tight (DXHR)

This category includes liquid-tight flexible metal conduit, in trade sizes 3/8 to 4 in. incl., for installation in accordance with Article 351 of the National Electrical Code. Liquid-tight flexible metal conduit is intended for use with conductors in circuits of 600 V, nominal or less. This product may also be used for installation of conductors in motor circuits in accordance with Article 430, and for electric signs and outline lighting in accordance with Article 600.

Liquid-tight flexible metal conduit suitable for direct burial and in poured concrete is marked "Direct Burial", "Burial", "Dir Burial", or "Dir Bur".

Liquid-tight flexible metal conduit is sunlight resistant and suitable for use outdoors.

Where terminated in fittings investigated for grounding and where installed with not more than 6 ft (total length) in any ground return path, liquid-tight flexible metal conduit in the 3/8 and 1/2 in. trade sizes is suitable for grounding where used on circuits rated 20 amps or less, and the 3/4, 1, and 1-1/4 in. trade sizes are suitable for grounding where used on circuits rated 60 amps or less. See the category "Conduit Fittings" (DWTT) with respect to fittings suitable as a grounding means.

Liquid-tight Flexible Metal Conduit

The following are not considered to be suitable as a grounding means:

- 1) The 1-1/2 in. and larger trade sizes.
- 2) The 3/8 and 1/2 in. trade sizes where used on circuits rated higher than 20 amps, or where the total length in the ground return path is greater than 6 ft.
- 3) The 3/4, 1, and 1-1/4 in. trade sizes where used on circuits rated higher than 60 amps, or where the total length in the ground return path is greater than 6 ft.

Liquid-tight flexible metal conduit that is not marked with a temperature designation or is marked "60 C" is for use at temperatures not in excess of 60 C (140 F).

Conduit that is for use in dry or oily locations at a temperature higher than 60 C (140 F) is marked "_____ C dry, 60 C wet, 70 C oil res" or "_____ C dry, 60 C wet, 70 C oil resistant" with "80" or "105" inserted as the dry-locations temperature.

Conduit that is marked "80 C dry, 60 C wet, 60 C oil res" or "80 C dry, 60 C oil resistant" is for use at 80 C (176 F) and lower temperatures in air, and at 60 C (140 F) and lower temperatures where exposed to water, oil or coolants.

Conduit that has not been evaluated for use where exposed to oil is marked "OIL-FREE ENVIRONMENTS ONLY."

The basic standard used to investigate products in this category is UL 360 "Liquid-Tight Flexible Steel Conduit".

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Liquid-Tight Flexible Metal Conduit".

Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)

USE AND INSTALLATION

This category covers includes liquid-tight flexible nonmetallic conduit, in trade sizes 3/8 in. to 4 in. inclusive, for installation in accordance with Article 351 of the National Electrical Code for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors for electric signs and outline lighting in accordance with Article 600.

PRODUCT MARKING

Liquid-tight flexible nonmetallic conduit suitable for direct burial and in poured concrete is marked "Direct Burial," "Burial," "Dir Burial," or "Dir Bur."

Liquid-tight flexible nonmetallic conduit suitable for use outdoors is marked "Outdoor."

Liquid-tight flexible nonmetallic conduit is marked with the product name in conjunction with the Listing Mark and the type of construction: "A" for layered conduit, "B" for integral conduit and "C" for corrugated conduit or with "FNMC-A" for layered conduit, "FNMC-B" for integral conduit and "FNMC-C" for corrugated conduit.

Liquid-tight flexible nonmetallic conduit that is not marked with a temperature designation or is marked "60 C" is for use at temperatures not in excess of 60 C (140 F).

Conduit that is for use in dry or oily locations at a temperature higher than 60 C (140 F) is marked "_____ C dry, 60 C wet, 70 C oil res" or "_____ C dry, 60 C wet, 70 C oil resistant" with "80 C" or "105 C" inserted as the dry locations temperature.

Conduit that is marked "80 C dry, 60 C wet, 60 C oil res" or "80 C dry, 60 C wet, 60 C oil resistant" is for use at 80 C (176 F) and lower temperatures in air, and at 60 C (140 F) and lower temperatures where exposed to water, oil or coolants.

RELATED PRODUCTS

Fittings for use with liquid-tight nonmetallic conduit are covered under Conduit Fittings (DWTT) and are suitable only for the type of conduit indicated by the marking on the fitting.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1660, "Liquid-Tight Flexible Nonmetallic Conduit".

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and the following product name "Liquid-Tight Flexible Nonmetallic Conduit."

FLEXIBLE METAL CONDUIT (DXUZ)

These listings include flexible aluminum and steel conduit in trade sizes 5/16 to 4 in. incl. and flexible aluminum and steel conduit Type RW (reduced wall), in trade sizes from 3/8 to 3 in. incl., for installation in accordance with Article 350 of the National Electrical Code for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits in accordance with Article 430, and for electric signs and outline lighting in accordance with Article 600.

Flexible metal conduit (steel or aluminum) shall not be used underground (directly buried or in duct which is buried) or embedded in poured concrete or aggregate, or in direct contact with earth or where subjected to corrosive conditions. In addition, flexible aluminum conduit shall not be installed in direct contact with masonry in damp locations.

Flexible metal conduit no longer than six ft and containing circuit conductors protected by overcurrent devices rated at 20 amps or less is suitable as a grounding means.

Flexible metal conduit longer than six ft has not been judged to be suitable as a grounding means.

See the category Conduit Fittings (DWTT) with respect to fittings suitable as a grounding means.

To prevent possible damage to flexible aluminum conduit, and flexible aluminum and steel conduit Type RW, care must be exercised when installing connectors employing direct bearing set screws.

Flexible aluminum conduit is marked at intervals of not more than one ft with the letters "AL".

Flexible aluminum conduit Type RW is marked at intervals of not more than one ft with the letters "AL" and "RW".

Flexible steel conduit Type RW is marked at intervals of not more than one ft with the letters "RW".

The basic standard used to investigate products in this category is UL1, "Flexible Metal Electrical Conduit".

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product names as appropriate: "Flexible Aluminum Conduit", "Flexible Steel Conduit", "Flexible Aluminum Conduit Type RW", or "Flexible Steel Conduit Type RW".

INTERMEDIATE FERROUS METAL CONDUIT (DYBY)

This category covers intermediate ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 1/2 to 4 (metric designators 16 to 103) inclusive for installation in accordance with Articles 300 and 345 of the National Electrical Code, NFPA 70.

Galvanized intermediate steel conduit installed in concrete does not require supplementary corrosion protection.

Galvanized intermediate steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity less than 2000 ohm-centimeters.

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

RELATED PRODUCTS

Fittings for use with unthreaded intermediate ferrous metal conduit are covered under Conduit Fittings (DWTT) and are suitable only for the type of conduit indicated by the marking on the carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1242, "Electrical Intermediate Metal Conduit - Steel."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Intermediate Metal Conduit" or "IMC."

RIGID FERROUS METAL CONDUIT (DYIX)

This category covers rigid ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 3/8 to 6 (metric designators 12 to 155) inclusive for installation in accordance with Articles 300 and 346 of the National Electrical Code, NFPA 70 (NEC).

Galvanized rigid steel conduit installed in concrete does not require supplementary corrosion protection.

Galvanized rigid steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity (less than 2000 ohm-centimeters).

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

Conduit that is provided with a metallic or nonmetallic coating, or a combination of both, has been evaluated for resistance to atmospheric corrosion. Nonmetallic outer coatings that are part of the required resistance to corrosion have been additionally evaluated for resistance to the effects of sunlight.

Nonmetallic outer coatings of greater than 0.010-in. thickness are investigated with respect to flame propagation detrimental effects to any underlying corrosion protection, the fit of fittings and electrical continuity of the connection of conduit to fittings.

Conduit with nonmetallic coatings has not been evaluated for use in ducts, plenums, or other environmental air spaces in accordance with Section 300-22 of the NEC.

UNEVALUATED FACTORS

Rigid metal conduit with or without a nonmetallic coating has not been evaluated for severely corrosive conditions.

RELATED PRODUCTS

Fittings for use with unthreaded rigid metal conduit are covered under Conduit Fittings (DWTT) and are suitable only for the type of conduit indicated by the marking on the carton.

Other Listings for elbows are covered under Conduit Fittings (DWTT).

ADDITIONAL INFORMATION

For additional information, see Conduit Fittings (DWTT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 6, "Electrical Rigid Metal Conduit - Steel."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify product manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Metal Conduit."

As appropriate, a designation such as "steel" is appended to the product name or is substituted for the word "metal" in the product name.

CONDUIT, RIGID NONFERROUS METALLIC (DYWV)

This category covers rigid nonferrous metal conduit that includes straight conduit, elbows, and nipples in trade sizes 3/8 to 6 (metric designators 12 to 155) inclusive for installation in accordance with Articles 300 and 346 of the National Electrical Code, NFPA 70.

Aluminum conduit used in concrete or in contact with soil requires supplementary corrosion protection.

UNEVALUATED FACTORS

Supplementary nonmetallic coatings as part of the conduit have not been investigated for resistance to corrosion.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 6A, "Electrical Rigid Metal Conduit - Aluminum, Bronze, and Stainless Steel."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Metal Conduit."

As appropriate, a designation such as "stainless steel," "silicon-bronze" or "aluminum" is appended to the product name or is substituted for the word "metal" in the product name.

REINFORCED THERMOSETTING RESIN CONDUIT (DZKT)

USE

This category covers reinforced thermosetting resin conduit and fittings intended for installation in accordance with Articles 347 and 710 of the National Electrical Code.

Reinforced thermosetting resin conduit has been evaluated for use with conductors rated 90 C or less.

PRODUCT MARKINGS

Conduit marked "Below Ground" or "BG" has been evaluated for underground use only - for direct burial, with or without being encased in concrete.

Conduit marked "Above Ground" or "AG" has been evaluated for use aboveground, underground and for direct burial with or without encasement in concrete. This conduit has been evaluated for concealed or exposed work where not subject to physical damage.

Reinforced thermosetting resin conduit, elbows, bends and other fittings which have been investigated for direct exposure to reagents are identified by the designation "Reagent Resistant" and are marked to indicate the specific reagents.

SIZES

Reinforced thermosetting resin conduit is Listed in sizes 1/2 to 6 in. inclusive in IPS, ID, RTRC 40 and RTRC 80 dimensions, as marked on the product. Listing includes straight conduit, elbows, bends, and other fittings, unless otherwise noted.

INSTALLATION INSTRUCTIONS

Reinforced thermosetting resin conduit is designed for connection to couplings, fittings and boxes by use of a suitable epoxy-type cement or drive-on bell and spigot. Instructions supplied by the epoxy-type cement manufacturer describe the method of assembly and precautions to be followed.

RELATED EQUIPMENT

For underground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Underground, Plastic Conduit (EAXX). For above-ground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Schedule 40 and Schedule 80 PVC Conduit (DZXR).

For additional information, see Conduit and Fittings (DWFV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1684, "Reinforced Thermosetting Resin Conduit (RTRC) and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "RTRC" or "Reinforced Thermosetting Resin Conduit," "Conduit Fitting," "Adapter," "Coupling" or other appropriate product name. Red printing on a yellow background is used as an identifying means for the Listing Mark.

RIGID NONMETALLIC, SCHEDULE 40 AND SCHEDULE 80 PVC CONDUIT (DZXR)

This category covers rigid nonmetallic PVC conduit (Schedule 40 and Schedule 80) intended for installation as rigid nonmetallic raceway for wires and cables in accordance with Articles 300 and 347 of the National Electrical Code, NFPA 70 (NEC). Products covered by this category include straight conduit, and elbows in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive.

Schedule 40 conduit is suitable for underground use by direct burial or encasement in concrete. Unless marked "Underground Use Only" or equivalent wording, Schedule 40 conduit is also suitable for above ground use indoors or outdoors exposed to sunlight and weather where not subject to physical damage.

Schedule 80 conduit has a reduced cross-sectional area available for wiring space and is suitable for use wherever Schedule 40 conduit may be used. The marking "Schedule 80 PVC" identifies conduit suitable for use where exposed to physical damage and for installation on poles in accordance with the NEC.

Unless marked for higher temperature, rigid nonmetallic conduit is intended for use with wires rated 75°C or less including where it is encased in concrete within buildings and where ambient temperature is 50°C or less. Where encased in concrete in trenches outside of buildings it is suitable for use with wires rated 90°C or less.

Listed PVC conduit is inherently resistant to atmosphere containing common industrial corrosive agents and will also withstand vapors or mist of caustic, pickling acids, plating bath and hydrofluoric and chromic acids.

PVC conduit and elbows (including couplings) that have been investigated for direct exposure to other reagents, may be identified by the designation "Reagent Resistant" printed on the surface of the product. Such special uses are described as follows: Where exposed to the following reagents at 60°C or less: Acetic, Nitric (25°C only) acids in concentrations not exceeding 1/2 normal; hydrochloric acid in concentrations not exceeding 30 percent; sulfuric acid in concentrations not exceeding 10 normal; sulfuric acid in concentrations not exceeding 80 percent (25°C only); concentrated or dilute ammonium hydroxide; sodium hydroxide solutions in concentrations not exceeding 50 percent; saturated or dilute sodium chloride solution; cottonseed oil, or ASTM 3 petroleum oil.

PVC conduit is designed for connection to couplings, fittings and boxes by the use of a suitable solvent-type cement. Instructions supplied by the solvent-type cement manufacturer describe the method of assembly and precautions to be followed.

RELATED PRODUCTS

For additional Listings of rigid nonmetallic conduit suitable for underground use, see Reinforced Thermosetting Resin Conduit (DZKT) and Rigid Nonmetallic Underground Conduit, Plastic (EAXX).

Fittings for rigid nonmetallic conduit are covered under Conduit Fittings (DWTT).

ADDITIONAL INFORMATION

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For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 651, "Schedule 40 and 80 Rigid PVC Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Nonmetallic Conduit Aboveground and Underground (Schedule 40)" or "Rigid Nonmetallic Conduit Aboveground and Underground Extra Heavy Wall (Schedule 80)."

Conduit, Rigid Underground, Other Than Plastic, Fiber Type (EALZ)

This listing covers impregnated fiber conduit, for use only when installed underground as raceway for the installation of wires and cables in accordance with the National Electrical Code. For plastic types of underground conduit, see Plastic Underground.

The conduit is designed for use in underground work under the following conditions: When laid with its entire length in concrete, identified as "Type I", without being encased in concrete, identified as "Type II".

Where conduits emerge from underground installation the wiring method should be of a type recognized by the National Electrical Code.

This listing includes straight conduit in lengths up to 10 ft (not for field bends) sizes 1/2- to 6-in. incl., for use with factory made elbows, couplings, reducers and other terminal fittings.

The basic standard used to investigate products in this category is UL543, "Electrical Impregnated Fiber Conduit".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Rigid Nonmetallic Underground Conduit".

RIGID NONMETALLIC UNDERGROUND CONDUIT, PLASTIC (EAXX)

This category covers plastic types of Rigid Nonmetallic Conduit, intended for installation underground as raceway for wires and cables in accordance with Articles 347 and 710 of the National Electrical Code. This conduit may be: (1) polyvinyl chloride (PVC) Type A or Type EB; or (2) high density polyethylene (HDPE) Schedule 40. Products covered by this category include straight conduit, elbows, and other bends in sizes 1/2 to 6 inclusive.

The conduit is intended for underground use under the following conditions, as indicated on the Listing Mark: (1) when laid with its entire length in concrete in any location (Type A), (2) when laid with its entire length in concrete in outdoor trenches (Type EB) and (3) direct burial with or without being encased in concrete (HDPE Schedule 40). The conduit is intended for use in ambient temperatures of 50 C or less.

Unless marked otherwise, Type A and HDPE Schedule 40 conduit are intended for use with wires rated 75 C or less. Type EB and Type A conduit, where encased in concrete in trenches outside of buildings, may be used with wires rated 90 C or less. HDPE Schedule 40 conduit, when directly buried or encased in concrete in trenches outside of buildings may be used with wire rated 90 C or less.

Where conduits emerge from underground installation the wiring method shall be of a type recognized by the National Electrical Code for the purpose.

PVC conduit is designed for joining with PVC couplings by the use of a solvent-type cement. HDPE conduit is designed for joining by threaded couplings, drive on couplings, or a butt fusing process. Instructions supplied by the solvent-type cement manufacturer describe the method of assembly and precautions to be followed.

For additional Listings of Rigid Nonmetallic Conduit for underground use, see the categories of Reinforced Thermosetting Resin Conduit (DZKT) and Rigid Nonmetallic, Schedule 40 and Schedule 80 PVC Conduit (DZYR).

The basic standard used to investigate products in this category is UL651A, "Type EB and A Rigid PVC Conduit and HDPE Conduit".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as

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appropriate: "Rigid Nonmetallic Conduit Underground (High Density Polyethylene, Schedule 40)"; "Rigid Nonmetallic Conduit Underground For Concrete Encasement Only (Type A)"; Rigid Nonmetallic Conduit Underground For Concrete Encasement In Outdoor Trenches Only. Not For Use in Ceilings, Floors or Walls (Type EB)".

CONNECTORS, SPECIAL PURPOSE (ECIS)

This category covers connector systems employing nonstandard blade, slot and/or pin configurations that are intended for use in special-purpose applications in wiring systems recognized by the National Electrical Code (NEC), or in highway lighting, utility company installations, and similar uses not within the scope of the NEC. These devices may incorporate switches or overcurrent protection. The connector systems may include the following types of products:

Equipment, Power or Female Outlet — A female contact device for mounting in or on utilization equipment.

Receptacle — A female contact device intended to be installed in or on a wiring system to supply current to utilization equipment.

Plug — A male contact device for connection and disconnection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection for an attachment plug or, as an appliance coupler to a male inlet.

Equipment, Power or Male Inlet — A male contact device to be mounted in or on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

Breakaway Connector — A connector that is not intended for routine disconnection under load, but which is intended to separate from its mating half when subjected to an impact force in an emergency situation.

Hybrid Connector — A connector employing two or more dedicated constructions of blades, pins or contacts that are intended to perform different functions, such as handling power, signal currents, or fiber optic transmissions.

These Listings do not cover devices to be molded on flexible cord or wire or unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and they are judged as part of a complete assembly.

These Listings do not cover general purpose devices. Refer to the categories of Attachment Plugs (AXGV) and Receptacles (RTDV) for further information on these products.

These Listings do not cover pin and sleeve type devices. Refer to the category of Pin and Sleeve Type Plugs, Receptacles and Cable Connectors (QLGD) for further information on these products.

TERMINALS:

The termination of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the National Electrical Code. The ampacity of the flexible cords and cables is based on Section 400-5, Tables 400-5(A) and 400-5(B). Product Markings or the manufacturer's instructions provided with the device indicate conductor size(s) to be used. Unless stated otherwise in the individual Listings below, the terminations are based on the use of 60 C flexible cord or cable.

Unless stated otherwise in the individual Listings, the termination provisions of all devices for fixed wiring installations are based on use of conductors having temperature ratings marked on the product at their ampacities specified in Table 310-16 of the National Electrical Code. These temperature ratings may be represented by a 7 or 9 associated with the marking "CU", "AL" or "AL-CU", i.e., "AL9", "AL9CU", "AL7CU", "CU7" or "CU9".

Terminals not marked "AL-CU" are for use with copper conductors only. Terminals marked "AL-CU" are for use with aluminum, copper and copper-clad aluminum conductors.

RATINGS:

These devices are rated 600 volts or less, ac or dc; and 200 amps or less. They may also be rated in wattage or in horsepower as noted in the individual Listings.

The devices are tested on circuits involving full rated potential to ground, except for multiphase rated devices which are tested on circuits consistent with their voltage ratings; for example, a 120/208 volts, 3-phase, device is tested on a circuit involving 120 volts to ground.

GROUNDING:

Devices having a terminal identified by a green colored finish, the words "green" or "ground", the letters "G" or "GR", or the "inverted-Christmas-tree" grounding symbol are grounding types. The blade, pin or contact member connected to this terminal is for equipment grounding only.

APPLICATION:

Each individual connector Listing may contain features that are unique to a system or application. Information concerning special installation pro-

cedures, compatibility and other important design features are provided in the individual Listing information, on product markings, on product data sheets and/or in installation instructions. The individual Listing information contains the following information:

Standards — Identifies the UL requirements used to evaluate the connectors.

Maximum Use Temperature — Assigned to the connector systems based upon the temperature rating of the insulation of the intended conductors or the insulating materials used in the connectors, whichever is less.

Installation — Indicates whether the connectors are intended for use on flexible cords or as a part of a fixed wiring system. Specifies whether the connectors are intended for use within and overall enclosure, within locations where they will be concealed (not readily accessible) after on site interconnection of modules or building components; or where they will be exposed. Connectors intended for exposed or concealed installation are evaluated for electrical insulation, mechanical strength, temperature rise, fault-current withstand, and effectiveness of grounding path to demonstrate equivalency to the wiring system on which they are intended to be installed.

Other Conditions — Describes other conditions of use for which the connector system has been evaluated, including but not limited to environmental factors and enclosure type designations.

LISTING MARK:

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, or on the product when size or shape permits, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Special Purpose Connector" or other appropriate product name as specified in the individual Listings.

CORD SETS AND POWER SUPPLY CORDS (ELBZ)

This listing covers: (1) cord sets and (2) power supply cords for use as supply connections for portable appliances and (3) shore power cable sets for use as supply connections to boats that are moored to a dock.

Cord sets and power supply cords are not intended to be used as a substitute for the fixed wiring of a structure and, hence, are not intended to be fastened in place. Cord sets and shore power cable sets are rated in volts, amps and watts.

Cord sets, shore power cable sets, and power supply cords are commonly furnished in hanked or coiled form. If used in this condition, excessive heating may occur. Therefore, when placed into service, all wrappings should be removed, and the flexible cord should be extended for its entire length.

For information regarding the Flexible Cord Types and their ratings, see Guide ZJCZ information.

Cord Sets:

A cord set consists of a length of flexible cord assembled (1) to an attachment plug or current tap as a line fitting and a cord connector as a load fitting, and with or without a through-cord switch, or (2) with a series-connected current tap and a pendant switch.

Cord sets are designated as one of the following types and are so identified by the Listing Mark:

Cord Set — This is a cord set intended for general use indoors and assembled with general use flexible cord and general purpose fittings. These cord sets may be less than 6 feet long but not less than 3 feet long. Cord sets shorter than 6 feet long are marked to indicate their length. Cord sets may also have integral restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under the category of Cord Restraint Devices, (ELDW).

Outdoor Use Cord Set — This is a cord set assembled with outdoor type flexible cord without a switch, and which is intended for use outdoor to supply portable electric equipment. It is: (1) marked "Suitable For Use With Outdoor Appliances — Store Indoors While Not In Use", (2) suitable for supplying portable outdoor appliances within their marked voltage, amp and wattage rating, (3) intended for use outdoors only while the equipment supplied is in use and (4) intended to be stored indoors (i.e., where not exposed to sunlight and/or weather) while not in use. Such a cord set has been investigated to determine (1) that the materials in the flexible cord and in the line and load fittings, and (2) the adhesion between the cord jacket and the bodies of the line and load fittings are suitable for periodic use outdoors.

The connection between the attachment plug cap and the outlet device supplying the cord set, and between the supply cord of any connected appliance and the load end of the cord set, should not be subjected to moisture or dampness. Outdoor Use Cord Sets may also have integral

restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under the category of Cord Restraint Devices, (ELDW).

Extension Cords

Adaptor Cord Set — This is an outdoor use cord set, without a switch consisting of an attachment plug a length of extra-hard-usage outdoor type flexible cord, and one or more load fittings providing a total of not more than three outlets. It is for use in areas such as construction sites to provide power to two or three outlets from a single outlet, or to convert from one outlet configuration to another.

Cord set for Recreational Vehicles — This is an outdoor use cord set intended for use in supplying power to recreational vehicles.

Shore Power Cable Set — A shore power cable set is an outdoor use cord set that is used in supplying power to boats that are moored to a dock. They are intended to be stored aboard the boat where not exposed to sunlight and/or weather while not in use. The line and load fittings are of the locking type, rated not less than 20 amps and are to be connected to suitable shore power outlet and hull power inlet devices, respectively. The connection of the attachment plug to a shore based power outlet and the connection of the cord connector to a shore power inlet, aboard a boat, provide a seal against water. Shore power cable sets are also Listed under Guide UBWW in the "Marine Products Directory".

Power Supply Cords:

Power supply cords may be either: (A) the nondetachable type or (B) the detachable type. Any item attached to the load end of a nondetachable power supply cord is not included as part of this listing.

Power supply cords are designated as one of the following types and are so identified by the Listing Mark:

(A) Nondetachable Types:

- (1) **Power Supply Cord** — This is a power supply cord consisting of a length of flexible cord assembled with an attachment plug or current tap as a line fitting but without a cord connector (appliance coupler) at the opposite end. It is intended for direct wiring connection to an appliance and it may include a through cord switch. Nondetachable power supply cords may be one of the following:
 - (a) **Power Supply Cord For General Use** — This is a power supply cord consisting of a suitable fitting for line connection assembled to a length of general purpose flexible cord, and may include a through cord switch.
 - (b) **Power Supply Cord For Ranges and Dryers** — This is a power supply cord consisting of general use nondetachable power supply cord constructed using Type SRD or SRDT flexible cable. The flexible cable may employ a neutral conductor which is two Awg sizes smaller than the other circuit conductors, but not smaller than 10 Awg.
- (2) **Outdoor Use Power Supply Cord** — This is a power supply cord assembled with outdoor type flexible cord. It is for use with portable outdoor appliances.
- (3) **Power Supply Cord for Recreational Vehicles** — This is an outdoor use power supply cord with the outer surface of the flexible cord marked "For Recreational Vehicle Use: _____ Amps".
- (4) **Power Supply Cord for Mobile Home** — This is an outdoor use power supply cord with the outer surface of the flexible cord marked "For Mobile Home Use: _____ Amps".
- (5) **Power Supply Cord — Special Use** — A power supply cord — Special use is intended for restricted use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

(B) Detachable types:

- (1) **Detachable Power Supply Cord** — A detachable power supply cord consists of a length of flexible cord assembled with (1) an attachment plug or current tap as a line fitting at one end and (2) a single outlet load fitting (appliance coupler) at the opposite end. It is intended for use and packaging with appliances. It may be one of the following types:
 - (a) **Detachable Power Supply Cord Having An Appliance Plug** — This is a power supply cord, not less than 2 feet long, with an appliance plug as a load fitting.
 - (b) **Detachable Power Supply Cord Having A Flatiron Plug** — This is a power supply cord, not less than 6 feet long, having a heater cord and a flatiron plug as a load fitting.
 - (c) **Detachable Power Supply Cord For Appliances Rated Not Greater Than 50 Watts** — This is a power supply cord for use with hand held appliances rated 50 watts or less and having a load fitting (appliance coupler) for use with electric shavers, electric scissors, electric combs and the like.
- (2) **Detachable Power Supply Cord — Special Use** — A detachable power supply cord — special use is intended for restricted

use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

The basic standard used to investigate products in this category is UL817, "Cord Sets and Power Supply Cords".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Cord Set", "Outdoor Use Cord Set", "Adaptor Cord Set", "Cord Set For Recreational Vehicles", "Shore Power Cable Set", "Power Supply Cord", "Replacement Power Supply Cord", "Outdoor Use Power Supply Cord", "Replacement Outdoor Use Power Supply Cord", "Power Supply Cord For Recreational Vehicles", "Power Supply Cord For Mobile Home", "Power Supply Cord-Special Use", "Detachable Power Supply Cord", "Replacement Detachable Power Supply Cord", "Detachable Power Supply Cord-Special Use".

All Listing Marks are applied to each individual piece except for "Power Supply Cord", "Outdoor Use Power Supply Cord", and "Detachable Power Supply Cord". These latter products are bulk labeled (label applied to smallest container indicating number of pieces) and are not intended for field application.

CORD RESTRAINT DEVICES (ELDW)

The Listing covers devices provided with retention means intended to reduce the likelihood of an attachment plug of an appliance becoming unintentionally detached from a mating cord connector of a cord set or a fixed receptacle. These devices are constructed such that (1) the plug and mating connector or receptacle are not enclosed so as to permit dissipation of any heat generated at the connection and (2) the plug can be separated from the mating cord connector or receptacle without the use of a tool.

The devices covered in this Listing are not an integral or permanently attached component of a cord set or receptacle, but rather are separate add on devices. Cord restraint devices which are integral or permanently attached to a cord set are covered under the category of Cord Sets and Power Supply Cords, (ELBZ).

The Standard used as a guide to investigate products in this category is UL 817, "Cord Sets and Power Supply Cords".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify those products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following or other appropriate product name: "Cord Restraint Device."

SEASONAL USE CORD SETS (ELEV)

This category covers cord sets that are intended for use only with Christmas tree and similar seasonal decorative lighting outfits. They are provided with integral overcurrent protection and may incorporate outlet fittings that are factory-assembled onto the flexible cord between the end fittings. They are not intended for permanent installation or for use with other than seasonal lighting products.

The Listing Mark of Underwriters Laboratories Inc. is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Seasonal Use Cord Set".

UTILITY SERVICE CORD SETS (ELFT)

The products covered in this category are Utility Service Cord Sets having an attachment plug of a unique, non-standard configuration intended for mating with a Utility Service Receptacle (see Guide RVNW) which utilizes the grounded neutral conductor of the supply as the equipment grounding conductor.

These cord sets are intended for use only by authorized utility company personnel in obtaining power from utility poles and as marked for example 125V, 15 amperes.

These cord sets were investigated in accordance with the requirements for Cord Sets and Power Supply Cords (UL 817) with regard to protection from the risk of electrical shock and their ability to function without overheating.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

Utility Service Cord Set
Classified By
Underwriters Laboratories Inc.
as to Protection from Electric Shock
and Ability to Function Without Overheating

CORD SETS WITH LEAKAGE CURRENT DETECTION AND INTERRUPTION (ELGN)

This category covers cord sets provided with leakage current detection and interruption. These products are intended to sense leakage currents flowing between or from the conductors of the cord set and interrupt the circuit. Under certain conditions, if this leakage current is allowed to continue flowing from the conductors, risk of ignition of surrounding combustible materials may result.

The ability of the devices to sense and interrupt leakage currents in locations other than the integral cord set have not been investigated.

When leakage current above a predefined limit is detected, the device removes the supply source from the cord either electronically or via "air break" contacts. The cord remains deenergized until the condition causing the excessive leakage current has cleared, or the device has been manually reset.

"Test" and "Reset" buttons, if provided, are not intended for "ON" / "OFF" control of connected load, unless specifically marked "ON" / "OFF".

These devices are not "Ground-fault protection of equipment" as anticipated by Section 426 of the National Electrical Code, nor are these devices "Ground Fault Circuit Interrupters" for personnel protection as defined by the National Electrical Code.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Cord Set with Leakage Current Detection and Interruption".

CRANE AND HOIST ELECTRIFICATION SYSTEMS (ELPX)

Crane and Hoist Electrification Systems are designed to provide electrical power from a fixed source to moving equipment.

Rigid systems consist of insulated contact conductors, collectors and feed in devices together with supports by which the system may be mounted on tram rails, crane bridges, or hoist runways.

Festoon systems consist of flexible cable secured at both ends, supported by moving carriers which may be mounted on tram rails, crane bridges or hoist runways with sufficient cable slack to allow moving equipment to travel a limited distance. The festoon system flexible cable is separately Listed under the classification Wires, Miscellaneous. The maximum voltage rating for both types is 600 v.

Crane and hoist electrification systems have not been investigated by UL for mechanical load carrying ratings. Systems which are marked with a mechanical load carrying rating also bear the following marking: "Mechanical load carrying ratings have not been investigated by Underwriters Laboratories Inc."

Some systems are duty cycle as well as continuous rated. These systems have been tested for a one minute "on", one minute "off" cycle. The applicable amp ratings are marked on the contact conductor or its sheath. Conductor overcurrent protection should not exceed the duty cycle rating.

Some rigid systems are suitable for outdoor use and are so marked on a main nameplate.

Crane and hoist electrification systems have not been investigated for use in corrosive atmospheres.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspection authorities and others concerned with the installation.

The Listing Mark of Underwriters Laboratories Inc. on each part or on the smallest unit container in which the complete system is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and an appropriate product name on each part (Conductor, Collector, Insulator, etc.) or the name "Crane and Hoist Electrification Systems" the smallest complete system container.

CURRENT TAPS AND ADAPTERS (EMDV)

GENERAL

This category covers current taps and adapters for use in accordance with NFPA 70, "National Electrical Code."

This category does not cover current taps or adapters rated at more than 200 A or for more than 600 V nor does this category directly apply to current taps wired to flexible cord or lampholder adapters, but supplements the standards for lampholder adapters covered in UL 496, "Edison-Base Lampholders" and current taps that can be wired to flexible cord covered in UL 498, "Attachment Plugs and Receptacles."

This category does not cover cord-connected, relocatable power taps intended only for indoor use as a temporary extension of a grounding, alternating-current branch circuit for general use, which are covered in UL 1363, "Relocatable Power Taps," nor does this category cover the current or voltage conversion circuitry capable of being used in travel adapters.

For purposes of this category, the following definitions apply:

Adapter — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle). [See Attachment Plugs, Fuseless (AXUT) for Listings of similar products.]

Current Tap — A male and female contact device that, when connected to an outlet receptacle or cord set, provides multiple outlets or outlet configurations. An outlet configuration may consist of a slot configuration, or provision for the connection of flexible cord.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Current Tap," "Tap," "Cube Tap" or "Adapter."

DATA PROCESSING CABLE (EMRB)

GENERAL

This category covers Type DP data processing cable for use in computer rooms and under the raised floors of computer rooms in accordance with Article 645 of NFPA 70, "National Electrical Code." The cable consists of one or more insulated conductors that are covered with a nonmetallic jacket. The cable may contain grounding conductors and/or optical fiber members.

PRODUCT MARKINGS

Data processing cable is identified by marking on the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

DP-1 — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

DP-1P — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

DP-2 — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

DP-2P — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262.

DP-3 — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

DP-3P — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable meets the requirements of NFPA 262.

Type DP-3 and Type DP-3P cable is for use in circuits having maximum available ac voltage of 30 V, dc voltage of 60 V, peak voltage of 42.2 V, VA of 100 and current of 8 A or in circuits designated DP-3 in UL 60950, "Information Technology Equipment."

Cable with aluminum conductors is surface printed "AL."

Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad."

Type DP-1, DP-2 and DP-3 cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surfaced marked with the suffix "-LS."

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF."

Type DP-1, DP-2 and DP-3 cable which has a damage height that does not exceed 4 ft. 11 in. when tested in accordance with the FT-4 Vertical-Tray Flame Test in UL 1581 may have the additional marking "FT-4" on the surface.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1690, "Data Processing Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Data Processing Cable, Type DP."

DIELECTRIC MEDIUMS (EOUV)

USE

This category covers liquids intended for use as dielectric and cooling mediums. The liquids are not intended to replace mineral oil unless equipment is also designed for the specific liquid.

These products have been Classified as to their fire hazard only, using Underwriters Laboratories Inc.'s method for Classification of the fire hazard of liquids. They have been rated numerically according to the schedule in which:

Diethyl Ether rates	100
Gasoline	90-100
Alcohol (ethyl)	60-70
Kerosene (100 F flash)	30-40
Paraffin oil	10-20
Water (nonflammable)	0

RELATED PRODUCTS

Liquids intended for use as dielectric and cooling mediums in electrical transformers are covered under Transformer Fluids (EOVK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 340, "Tests for Comparative Flammability of Liquids."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AS TO FIRE HAZARD ONLY (PRODUCT NAME)

CLASSIFIED

[MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN ELECTRIC ARC (if appropriate)]

TRANSFORMER FLUIDS (EOVK)

USE

This category covers liquids intended for use as dielectric and cooling mediums in electrical transformers.

These products have been Classified as to their fire hazard using Underwriters Laboratories Inc.'s method for Classification of the fire hazard of liquids. They have been rated numerically according to the schedule in which:

Diethyl Ether rates	100
Gasoline	90-100
Alcohol (ethyl)	60-70

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Diethyl Ether rates	100
Gasoline	90-100
Kerosene (100 F flash)	30-40
Paraffin oil	10-20
Water (nonflammable)	0

USE RESTRICTIONS

Products Classified as "less-flammable liquid" may have use restrictions on the product container. Certain fluids have fuse use restrictions which require that the fuse must be either a type which does not vent under normal operation, or it shall be installed external to the transformer tank.

ADDITIONAL INFORMATION

For additional information, see Dielectric Mediums (EOUV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 340, "Tests for Comparative Flammability of Liquids."

These products are also Classified as a "less-flammable liquid" or "non-flammable fluid" in accordance with Sections 450-23 or 450-24 of the National Electrical Code, NFPA 70.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AS TO FIRE HAZARD ONLY**(PRODUCT NAME)****CLASSED**

[MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN
ELECTRIC ARC (if appropriate)]

ALSO CLASSIFIED AS A "LESS-FLAMMABLE LIQUID"
IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE
WITH THE FOLLOWING "USE RESTRICTIONS" (as appropriate)
or

AS TO FIRE HAZARD ONLY**(PRODUCT NAME)****CLASSED**

[MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN
ELECTRIC ARC (if appropriate)]

ALSO CLASSIFIED AS A "NONFLAMMABLE FLUID"
IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE
WITH THE FOLLOWING "USE RESTRICTIONS" (as appropriate)

DIMMERS (EOVZ)

This category covers general use switch, commercial and theater lamp dimmers.

DIMMERS, COMMERCIAL (EOXT)

This category covers incandescent and fluorescent commercial dimmers.

RELATED PRODUCTS

See Dimmers, Theater (EPAR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Dimmers."

DIMMERS, GENERAL USE SWITCH (EOYX)

This listing covers dimmers for mounting in flush device boxes or on outlet box covers, unless otherwise stated in the individual listing. They are intended only for the control of permanently installed incandescent fixtures.

For additional information see snap switches, Guide WJQR.

The basic standard used to investigate products in this category is UL 20, "General Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List").

DIMMERS, THEATER (EPAR)**USE**

This category covers theater dimmers intended for mounting in theater switchboards.

RELATED PRODUCTS

Dimmers not intended for theater stage use are covered under Dimmers, Commercial (EOXT).

See Miscellaneous Switchboards for theater switchboards incorporating dimmers.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Theater Dimmers."

Dimmers, Theater, Controls (EPCT)

This category covers lighting control units intended to interface with stage, studio, and theater lighting dimming equipment.

These units may be provided with various controls that operate remote dimming equipment. The units are provided with a number of outputs to operate different types of dimming equipment and associated equipment. They may be provided with integral computer systems. Low voltage control circuit inputs and outputs comply with requirements for Class 2 circuits in accordance with Article 725 of the National Electrical Code.

The basic standard used to investigate products in this category is UL 1950, "Safety of Information Technology Equipment, Including Electrical Business Equipment".

The Listing Mark of Underwriters Laboratories, Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products include the UL symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name as appropriate: "Theater Lighting Control Console", or other appropriate product name.

**EARTHQUAKE ACTUATED
EQUIPMENT (FFPC)**

This category covers products with earthquake sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

INSTALLATION

Earthquake actuated gas shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake actuated electrical switches are intended for installation in accordance with the National Electrical Code, NFPA 70.

RELATED PRODUCTS

For Earthquake Actuated Shutoff Systems, see Guide of the same title (FFPH).

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

Earthquake actuated gas shutoff valves have been evaluated to ANSI Z21.70-(+), "Earthquake Actuated Automatic Gas Shutoff Systems."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Services. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, one of the following product names, as appropriate: "Earthquake Actuated Gas Shutoff System," "Earthquake Actuated Gas Shutoff Valve," "Earthquake Actuated Electrical Switch" or other appropriate product name as shown in the individual Listings, and "IN ACCORDANCE WITH ANSI Z21.70-(+), Earthquake Actuated Automatic Gas Shutoff Systems."

+ – issue date

EARTHQUAKE ACTUATED SHUTOFF SYSTEMS (FFPH)

This category covers products with earthquake sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

INSTALLATION

Earthquake actuated gas shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake actuated electrical switches are intended for installation in accordance with the National Electrical Code, NFPA 70.

RELATED PRODUCTS

For Earthquake Actuated Equipment, see Guide of the same title (FFPC).

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

Earthquake actuated gas shutoff valves have been evaluated to ASCE 25-(+), "Earthquake-Actuated Automatic Gas Shutoff Devices."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, one of the following product names, as appropriate: "Earthquake Actuated Gas Shutoff System," "Earthquake Actuated Gas Shutoff Valve," "Earthquake Actuated Electrical Switch" or other appropriate product name as shown in the individual Listings, and "IN ACCORDANCE WITH ASCE 25-(+), Earthquake-Actuated Automatic Gas Shutoff Devices."

+ – issue date

ELECTRIC VEHICLE SYSTEMS (FFQM)

Products and systems in this category are intended for use with or installation on automotive type vehicles for highway use, such as passenger automobiles, buses, trucks, vans, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery. Battery charging equipment can be supplied by a utility source, a fuel cell, photovoltaic array, or other source of power.

The physiological effects of chemical substances or gasses associated with the recharging of storage batteries have not been investigated.

ELECTRIC VEHICLE BATTERY PACKS (FFRW)

This category covers battery packs that have been investigated in accordance with the requirements of the National Fire Protection Association (NFPA) document NFPA 70, the National Electrical Code (NEC), Article 625, "Electric Vehicle Charging System Equipment," to determine whether or not a forced air ventilation system is required when a particular electric vehicle battery pack is charged using the specified charging system of the electric vehicle.

This category also covers Classified Electric Vehicle Battery Packs which are rebuilt by the original manufacturer or other parties having the necessary facilities, technical knowledge and skills. Electric Vehicle Battery Packs are rebuilt by using new or reconditioned parts and are subjected to the same requirements as new products.

Electric vehicle battery packs employing non-vented batteries or batteries whose chemistry cannot produce hydrogen are investigated by inspection of the manufacturer's product.

Electric vehicle battery packs employing batteries that can emit hydrogen, such as valve regulated or vented lead-acid or nickel-metal hydride batteries, are subjected to evaluation in accordance with SAE (Society of Automotive Engineers) Recommended Practice J1718 (1994), "Measurement of Hydrogen Gas Emission From Battery-Powered Cars and Light Trucks During Battery Charging." Battery systems which do not produce hydrogen concentrations in excess of 1% (25% of the lower flammability limit) are considered in compliance with the requirements of NEC Article 625.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service. The Classification Marking for these products

includes the Classification symbol of Underwriters Laboratories Inc. as illustrated in the Introduction to this Directory.

Electric Vehicle Battery Pack

For charging indoors without mechanical building ventilation in (Company Name) Electric Vehicle (Model, Name). (control number)

Additionally for rebuilt products, the word "Rebuilt", "Remanufactured", or "Reconditioned" precedes the product name.

ELECTRIC VEHICLE CABLE (FFSO)

GENERAL

This category covers electric vehicle cable constructed as described in, and Listed for use in accordance with Article 400 of NFPA 70, "National Electrical Code." Electric vehicle cable consists of two or more insulated conductors, with or without grounding conductors, with an overall jacket. The insulation and jacket are both thermoset on Types EVJ and EV, thermoplastic elastomer (TPE) on Types EVJE and EVE, and thermoplastic (PVC) on Types EVJT and EVT.

The cable is used to supply power, signal, and control to electric vehicles during the charging process. It is rated 60 to 105°C (140 to 221°F) dry; 60°C (140°F), 75°C (167°F), or 90°C (194°F) wet; 60°C (140°F) where exposed to oil, and for use where exposed to the direct rays of the sun. For cable so marked, a gasoline immersion rating is also assigned. The term "wet" indicates that the cable is acceptable for immersion in water. Electric vehicle cable employs flexible stranded copper conductors in a size range of 18 AWG to 500 kcmil.

Type EVJ - Rated 300 V, contains two to five 18-12 AWG thermoset-insulated circuit conductors, and may employ one or two insulated grounding conductors. The cable may contain hybrid data, signal, communications, and/or optical fiber cable.

Type EVJE - Rated 300 V, same as Type EVJ except that the cable employs thermoplastic elastomer-insulated conductors and jacket.

Type EVJT - Rated 300 V, same as Type EVJ except that the cable employs thermoplastic (PVC) insulated conductors.

Type EV - Rated 600 V, contains two or more 18 AWG to 500 kcmil thermoset-insulated circuit conductors, and may employ one or more insulated grounding conductors. The cable may contain hybrid data, signal, communications, and/or optical fiber cable.

Type EVE - Rated 600 V, same as Type EV except that the cable employs thermoplastic elastomer-insulated conductors.

Type EVT - Rated 600 V, same as Type EV except that the cable employs thermoplastic (PVC) or thermoset-insulated conductors.

ADDITIONAL INFORMATION

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 62, "Flexible Cord and Fixture Wire" and UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Vehicle Cable."

ELECTRIC VEHICLE CHARGING SYSTEM EQUIPMENT (FFTG)

This listing covers charging system equipment, either conductive or inductive, for use with electric vehicles. The equipment can be located on- or off board the vehicle.

The basic standards used to investigate products in this category are UL583, "Electric Battery Powered Industrial Trucks", and UL1564, "Industrial Battery Chargers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, "Electric Vehicle" or "EV" and the following product name: "Charging System Equipment", "Battery Charger", "Charge Port", or "Charge Controller", or other appropriate product name shown in the individual listings.

**ELECTRIC VEHICLE CHARGING SYSTEMS,
INDOOR CHARGING WITHOUT
VENTILATION (FFTY)**

These electric vehicle charging systems, either inductive or conductive, have been investigated in accordance with the requirements of the National Fire Protection Association (NFPA) document NFPA 70, the National Electrical Code (NEC), Article 625, "Electric Vehicle Charging System Equipment," to determine whether mechanical ventilation is required during charging of the specified electric vehicle battery pack in an enclosed space.

Electric vehicle charging systems employing nonvented batteries or batteries whose chemistry cannot produce hydrogen are investigated by inspection of the manufacturer's product.

Electric vehicle charging systems employing batteries that can emit hydrogen, such as valve regulated or vented lead-acid or nickel-metal hydride batteries, are subjected to evaluation in accordance with SAE (Society of Automotive Engineers) Recommended Practice J1718 (1994), "Measurement of Hydrogen Gas Emission From Battery powered Cars and Light Trucks During Battery Charging." Battery systems which do not produce hydrogen concentrations in excess of 1% (25% of the lower flammability limit) are considered suitable for charging indoors without mechanical ventilation in accordance with the requirements of NEC Article 625.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the vehicle is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**Electric Vehicle Charging System
Classified by Underwriters Laboratories Inc.®**

For indoor charging without mechanical building ventilation in accordance with the National Electrical Code, NFPA-70-1996, Article 625 and SAE Recommended Practice J-1718 1994 when used with a UL Classified electric vehicle battery pack marked for use with the:

**(Company Name) (Model Name) electric vehicle.
(Control Number)**

Note: The word "Inductive" or "Conductive" may be included in the product name.

**ELECTRIC VEHICLE CHARGING SYSTEM
PERSONNEL PROTECTION EQUIPMENT
(FFUQ)**

This listing covers ground-fault protective devices for use with electric vehicle charging systems in accordance with the National Electrical Code, NFPA-70.

The products covered under this category include charging circuit interrupting devices and isolation monitor/interrupters.

A charging circuit interrupting device is one whose function is to detect ground fault current or other conditions that may be hazardous and cause interruption of the electric circuit to the charging system or the vehicle when a fault current to ground exceeds some pre-determined value that is less than that required to operate the overcurrent protective device of the circuit or, in some devices, when another hazardous condition, such as an open-circuited grounding conductor, is detected. A charging circuit interrupting device is intended to be used only in a circuit where one of the conductors is solidly grounded.

A Type CCID5 charging circuit interrupting device trips when the current to ground has a value in the range of 4 through 6 MIU. A Type CCID20 charging circuit interrupting device trips when the current to ground has a value of 20 MIU or greater. MIU, Measurement Indication Unit, is a value that corresponds to leadage current but accounts for the waveshape and frequency of the voltage.

A charging circuit interrupting device is marked to identify its suitability for use with a specific electric vehicle charging equipment or with power supplies with certain voltage, frequency and waveshape.

The acceptability of a Type CCID20 charging circuit interrupting device is based upon the voltage of the circuit and the level of insulation provided in the device to which it will be connected.

An isolation monitor/interrupter is a device whose function is to detect a path to ground on an isolated circuit and cause interruption of the electric circuit to the vehicle if a path that would permit 5 MIU or greater current to flow is detected. An isolation monitor/interrupter is intended for use in a separately derived isolated (ungrounded) circuit.

A device of the enclosed type that has been found suitable for use where it will be exposed to rain, is so marked.

The basic standard used to investigate products in this category is Outline of Investigation, Subj: 2231, "Personnel Protection Systems for Electric Vehicle Supply Circuits."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: Charging Circuit Interrupter Device", "Ground Monitor/Interrupter" or "Isolation Monitor/Interrupter".

**ELECTRIC VEHICLE POWER OUTLETS
(FFWA)**

This listing covers power outlets rated at 600 volts or less, intended for use indoor or outdoor where power is required for recharging of electric vehicle storage batteries.

The basic standard used to investigate products in this category is UL 231, "Power Outlets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Electric Vehicle (or EV) Power Outlet".

**ELECTRIC VEHICLE PROPULSION
SYSTEMS (FFYU)**

This listing covers propulsion motors and associated equipment, including power steering equipment, for use with electric vehicles.

Systems and equipment Listed herein have only been investigated to provide safeguards against fire and electric shock.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment", UL 583, "Electric-Battery-Powered Industrial Trucks", and UL 1004, "Electric Motors".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Electric Vehicle (or EV) Propulsion System", or other appropriate product name shown in the individual listings.

ELECTRICAL DEVICES (FGHZ)**RELAYS (FGVX)**

The basic standard used to investigate products in this category is UL 104, "Elevator Door Locking Devices and Contacts".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Reverse Phase Relay".

**ELECTRICAL METALLIC TUBING
(FJMX)
GENERAL**

This category covers electrical metallic tubing manufactured in trade sizes 3/8 to 4 (metric designators 12 to 103) inclusive for installation of conductors in circuits rated above or below 600 V, nominal, and in accordance with Article 348 of NFPA 70, "National Electrical Code."

Galvanized steel electrical metallic tubing installed in concrete on grade or above generally requires no supplementary corrosion protection. Galvanized steel electrical metallic tubing in concrete slab below grade level may require supplementary corrosion protection.

In general, galvanized steel electrical metallic tubing in contact with soil requires supplementary corrosion protection. Where galvanized steel electrical metallic tubing without supplementary corrosion protection extends directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

Aluminum electrical metallic tubing used in concrete or in contact with soil requires supplementary corrosion protection.

UNEVALUATED FACTORS

Supplementary nonmetallic coatings presently used have not been investigated for resistance to corrosion.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 797, "Electrical Metallic Tubing - Steel" and UL 797A, "Electrical Metallic Tubing - Aluminum."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Metallic Tubing" or "EMT."

ELECTRICAL METALLIC TUBING FITTINGS (FKAV)

GENERAL

This category covers electrical metallic tubing fittings from 3/8 to 4 in. incl. trade sizes, intended for installation and use in accordance with the following information and the limitations specified in Electrical Metallic Tubing (FJMX).

Indenter Fittings — Indenter type fittings are for use with metallic coated electrical metallic tubing only and require a special tool supplied by the manufacturer for proper installation. Diametrically opposed indenter type tools require two sets of indentations nominally 90° apart. Triple indent tools require one set of indentations.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Fittings suitable for use in poured concrete or where exposed to rain are so indicated on the device or carton. The term "rain tight" or the equivalent on the carton indicates suitability for use where directly exposed to rain. The term "concrete tight" or equivalent on the carton indicates suitability for use in poured concrete.

Fittings have been tested for use only with steel tubing unless marked on the device or carton to indicate suitability for use with aluminum or other material.

ADDITIONAL INFORMATION

For additional information, see Electrical Metallic Tubing (FJMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electrical Metallic Tubing Fitting," "EMT Fitting," "Connector," "Coupling" or other appropriate product name as shown in the individual Listings.

ELECTRICAL NONMETALLIC TUBING (FKHU)

USE AND INSTALLATION

This category covers electrical nonmetallic tubing (ENT) in trade sizes 1/2, 3/4, 1, 1-1/4, 1-1/2 and 2 for installation in accordance with NFPA 70, "National Electrical Code" (NEC).

Fittings — The outside diameters of ENT are such that standard connectors, couplings and outlet boxes for rigid PVC conduit can be employed for ENT that is also constructed of PVC. Installation instructions are provided with each bundle or coil of ENT outlining the procedure to be used when employing cemented-on PVC conduit fittings and outlet boxes. These techniques include the specific cement to be used as well as its application method. Other fittings are covered under Electrical Nonmetallic Tubing Fittings (FKKY).

ENT with mechanical fittings identified for the purpose or with cemented-on fittings is suitable for use in poured concrete.

ENT with cemented-on PVC fittings is suitable for use in:

- 1) Indoor locations where walls are frequently washed, and
- 2) Concrete slabs in direct contact with the earth.

PRODUCT MARKINGS

The product is provided with marking on the package, in combination with the UL Listing Mark (every 10 ft), specifying the wire temperature rating, minimum installation temperature of -4°F (-20°C), and maximum ambient temperature 122°F (50°C). Products Listed for 90°C wire insulation is suitable for use with 105°C rated GTO cable in accordance with

Section 600-32(b) of the 1996 NEC. The product may be provided with a marking on the package and in combination with the UL Listing Mark (every 10 ft) which reads "105 C GTO Cable."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1653, "Electrical Nonmetallic Tubing."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Nonmetallic Tubing."

FITTINGS (FKKY)

GENERAL

This category covers electrical nonmetallic tubing (ENT) fittings made in 1/2 to 1-in. trade sizes.

CARTON MARKINGS

Unless otherwise marked on the carton, fittings are suitable for use with any Listed ENT of the appropriate trade size. If a fitting is suitable for use with only specific manufacturer's ENT, the smallest unit carton of the fittings identifies the ENT manufacturer(s). Classified ENT (see FKMT) is suitable for use with compatible Listed ENT fittings, as identified on the ENT smallest unit carton. This compatibility marking appends any compatibility marking on the fitting carton.

Fittings suitable for use in concrete are identified by a marking on the carton. A fitting that is taped completely (from the raceway to the box or raceway-to-raceway) is concrete-tight, when the product carton is marked with "CONCRETE-TIGHT WHEN TAPED."

ADDITIONAL INFORMATION

For additional information, see Electrical Nonmetallic Tubing (FKHU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Nonmetallic Tubing Fittings" or "ENT Fittings."

ELECTRICAL NONMETALLIC TUBING CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (FKMT)

This category covers Classified electrical nonmetallic tubing in the 1/2 to 1 in. trade sizes that has been investigated and found suitable for use with specific compatible Listed electrical nonmetallic tubing fittings.

Products Classified under this category are also Listed under the category of Electrical Nonmetallic Tubing.

For additional information on installation and markings, see the Guide Information for Electrical Nonmetallic Tubing (FKHU).

LOOK FOR CLASSIFICATION MARKING ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the appropriate Listing Mark and the statement: "Also Classified For Use With UL Listed Fittings Specified On the Shipping Container."

Included on the spool or smallest unit shipping container is a list which tabulates the company name, catalog number, style of fitting and trade size of the compatible UL Listed Electrical Nonmetallic Tubing Fittings.

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKOT)

FLUORESCENT BALLASTS (FKVS)

This category covers fluorescent lamp ballasts for both alternating and direct current. The ballasts are high frequency electronic, resistor, choke

(reactor) coil, or transformer of the isolating or auto type for controlling the starting and operating voltages and currents of a fluorescent lamp. These ballasts are intended for connection in accordance with the National Electrical Code to branch circuits rated 600 V or less. The output voltages are 2500 V or less.

Ballasts are evaluated with their respective lamps and lampholders to determine the risk of electric shock during relamping.

Class P rated ballasts are provided with integral protection that prevents ballast overheating and are intended for use in lighting fixtures (luminaires) or signs. The protection has been evaluated in accordance with the requirements of Underwriters Laboratories Inc. for Class P fluorescent lamp ballasts. Class P rated ballasts are generally provided with an enclosure but may be an open type construction if the ballast is a simple reactance type.

Some ballasts exhibit an inrush of current at the moment of initial operation, unless internal circuitry is provided to minimize the inrush. The inrush is similar to that exhibited in tungsten-filament, incandescent lighting. Accordingly, it is recommended that lighting controls meet the tungsten-load requirement or be rated for use with the ballast in order to minimize incompatibility. See the guide information for the particular lighting control (such as Snap Switches, WJQR) for more information on how the controls are marked regarding tungsten inrush.

Fluorescent ballasts have the following designations of use as indicated below. The designations of use relate to different levels of corrosion protection provided. Each subsequent designation includes the uses above it in the following descriptions. For example, an outdoor ballast is acceptable wherever an indoor or open type ballast can be used.

OPEN TYPE: Open core and coil constructions (i.e., ballasts without complete metal enclosures) are intended for use within suitable enclosures.

INDOOR BALLASTS: Indoor ballasts are suitable for use in an indoor, dry location only.

OUTDOOR BALLASTS:

Type 1-Outdoor ballasts are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked "Type 1 Outdoor" or "Type 1".

Type 2-Outdoor ballasts are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked "Type 2 Outdoor" or "Type 2."

WEATHERPROOF BALLASTS: Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked "Weatherproof" or "WP".

Alternating current ballasts marked "high power factor" operate at 90 percent or higher power factor under the intended operating conditions or otherwise indicate those conditions, that result in less than 90 percent power factor. Ballasts marked "power factor corrected" indicate the value of the power factor.

Ballasts are marked with an output voltage when the output is over 300 V. The output voltage will be the maximum voltage existing between any two lead wires. Ballasts may additionally be marked with the maximum voltage to ground when it would aid in selecting lampholders. The voltage to ground will be the maximum voltage existing in any one lampholder and should be less than the rating of the lampholder.

Ballasts marked "For Use in Portable Lamps" have an output voltage of 150 V or less and are intended for use in portable lamps without grounding.

Ballasts marked "For use in permanently connected (or fixed) equipment only" are not intended for cord connected equipment.

Ballasts marked "Type CC" are intended for use in commercial cabinets, either refrigerated or non-refrigerated, and where the ballast circuit is designed to minimize arcing within the lampholder in the event lamps become loose in their lampholders.

Ballasts marked "Type HL" are intended for use in lighting fixtures in a Class I, Division 2, Hazardous (Classified) Location - defined in Article 500 of the National Electrical Code.

Ballasts with a nonmetallic enclosure and marked "Suitable for Air Handling Spaces" have enclosures that may be used in environmental air spaces as defined in Section 300-22(c) of the National Electrical Code. These products have been evaluated in accordance with UL 2043, "Standard Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

Ballasts suitable for dimming fluorescent lamps are marked to indicate such use and, unless the dimming control leads are marked for connection to a Class 2 limited energy circuit, the ballast is additionally marked with the catalog number of the dimming control for which the ballast is Listed.

For suitable controls to be used with ballasts for dimming fluorescent lamps, see Industrial Control Equipment-Miscellaneous Apparatus and Transformer Dimmers.

The basic standard used to investigate products in this category is UL 935, "Fluorescent Lamp Ballasts."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Fluorescent Lamp Ballast," or other appropriate product name.

HID BALLASTS (FLCR)

This category covers high intensity discharge (HID) lamp ballasts of the following types: mercury vapor, metal halide, high pressure sodium and low pressure sodium. These ballasts are intended for connection in accordance with the National Electrical Code to branch circuits rated 600 v or less. The output voltages are 1000 v or less.

Ballasts intended for remote mounting in recessed installations are: (1) thermally protected, (2) marked "Thermally Protected" or the equivalent, and (3) marked "Suitable for Recessed Use." These ballasts are intended to be installed in uninsulated or insulated ceilings with all insulation kept a minimum distance of 3 inches from the sides of the ballasts and not placed over the ballasts such that it would entrap the heat produced by the ballasts. The ballasts are provided with thermal protection to deactivate the ballasts should insulation be placed over or in contact with the ballasts.

Ballasts not intended for recessed installations may be provided with thermal protection. If the ballasts are provided with thermal protection, they are marked "Thermally Protected" or the equivalent. The effectiveness of such protection must be evaluated in combination with the specific fixture with which the ballast is used.

High intensity discharge lamp ballasts are restricted in use as indicated below. In regard to the corrosion protection provided, a ballast is acceptable for any use described above it in the following descriptions.

INDOOR BALLASTS: Indoor ballasts are suitable for use in indoor, dry, locations only.

OUTDOOR BALLASTS:

Type 1-Outdoor ballasts, are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked "Type 1 Outdoor" or "Type 1".

Type 2-Outdoor ballasts, are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked "Type 2 Outdoor" or "Type 2."

WEATHERPROOF BALLASTS: Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked "Weatherproof" or "WP".

The basic standard used to investigate products in this category is UL1029, "High Intensity Discharge Lamp Ballasts".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Ballast", "Mercury Lamp Ballast", or other appropriate product name.

HOLDERS FOR AUTOMATIC STARTERS (FLPZ)

This listing covers separate holders for automatic starters which are intended for use with electric discharge (fluorescent) lamps. Holders in combination with or designed to be assembled with lampholders are listed under Lampholders, Electric Discharge — 1000 Volts or Less. Unless otherwise noted, they are rated 660 watts, 250 volts.

The basic standard used to investigate products in this category is UL542, "Lampholders, Starters, and Starter Holders for Fluorescent Lamps".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Automatic Starter Holder".

STARTERS, AUTOMATIC (FMDX)

This listing covers automatic starters for electric discharge (fluorescent) lamps.

The basic standard used to investigate products in this category is UL542, "Lampholders, Starters, and Starter Holders for Fluorescent Lamps".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Automatic Starter", "Fluorescent Lamp Starter", or other appropriate product name.

STARTERS, MANUAL (FMRV)

This listing covers manual starter switches, and combinations of manual starter switches with line switches, for electric discharge (fluorescent) lamps.

The basic standard used to investigate products in this category is UL542, "Lampholders, Starters, and Starter Holders for Fluorescent Lamps".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Manual Starter", "Fluorescent Lamp Starter", or other appropriate product name.

MISCELLANEOUS (FNFT)

Products in this category include fluorescent ballasts and fluorescent lamp power reducers, fluorescent lamp life extenders, high intensity discharge (HID) lamp high-low dimmers, HID lamp starters, electromagnetic interference filters, related miscellaneous devices. These devices are for field installation, in accordance with their installation instructions, into Listed lighting fixtures employing fluorescent or high intensity discharge lamps.

Fluorescent power reducer devices are limited to installation only in fixtures employing thermally protected ballasts and are marked as such. The devices are designed for either high power factor, rapid start or high power factor, instant start ballasts, and marked as appropriate, unless marked for additional ballast types. These devices have not been evaluated for use on emergency lighting equipment or with dimming ballasts, unless marked otherwise.

HID lamp high-low dimmers are limited to installation only in or with fixtures employing the lamp wattage and type along with the ballast type and capacitor rating agreeing with the installation instructions provided with the dimmer.

The basic standards used to investigate products in this category are UL 1029, the Standard for High Intensity Discharge Lamp Ballasts and UL 935, the Standard for Fluorescent Lamp Ballasts, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the specific type of product as shown in the individual Listing.

ELEVATOR EQUIPMENT (FQKR)

Products listed under this category include Elevator Controls and Accessories, Elevator Control Panels, Elevator Relays, Elevator Switches, Elevator Door Locking Devices and Contacts, Passenger Elevator Car Enclosures and Elevator Oil Buffers.

Products covered in this section are for ordinary location use only. For listing covering Elevator Appliances for use in hazardous locations, see Elevator Appliances in the Hazardous Location Equipment Directory.

Elevator Doors and Door Hardware are covered under Fire Doors in the Building Materials Directory.

ELEVATOR CONTROLS AND ACCESSORIES (FQMW)

This Listing covers accessories and controllers for use in elevator applications and it includes elevator accessories such as push buttons, indicator lights, lighting fixtures and elevator controls such as power supplies (motor and door operators).

The basic standard used to investigate products in this category is UL 508 "Industrial Control Equipment".

Equipment evaluated in accordance with the requirements of the American National Standard Safety Code for Elevators and Escalators, ANSI

A17.1, and American National Standard Safety Code for Elevator and Escalator Electrical Equipment, ANSI/ASME A17.5, is marked to that effect.

Some devices are open type (without enclosures). This means that such devices are for use as parts of Listed equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type devices are acceptable.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word, "LISTED", a control number, and the following product name: "Elevator Control", "Elevator Accessory". Products additionally evaluated ANSI/ASME A17.1 and A17.5 may also be marked: "Also Evaluated In Accordance With ANSI/ASME A17.1 - (DATE) and A17.5 - (DATE)"

ELEVATOR CONTROL PANELS (FQPB)

USE

This category covers elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment.

ADDITIONAL INFORMATION

For additional information, see Elevator Equipment (FQKR), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product name "Open Elevator Control Panel" or "Enclosed Elevator Control Panel," and Statement No. 1 or No. 2 as applicable.

Statement No. 1: "As to electrical shock and fire hazard only. Classification does not include evaluation with respect to ANSI/ASME A17.1 or A17.5."

Statement No. 2: "As to electrical shock and fire hazard, and in accordance with ANSI/ASME A17.1 (date) and A17.5 (date)."

Equipment that has been investigated with respect to electrical shock and fire hazard only is marked with Statement No. 1.

Equipment that has been investigated in accordance with the requirements of ANSI/ASME A17.1, "American National Standard Safety Code for Elevators and Escalators" and ANSI/ASME A17.5, "American National Standard Safety Code for Elevator and Escalator Electrical Equipment" is marked with Statement No. 2.

ELEVATOR SWITCHES (FQRH)

The basic standard used to investigate products in this category is UL 104, "Elevator Door Locking Devices and Contacts".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Reverse Phase Relay".

ELEVATOR DOOR LOCKING DEVICES AND CONTACTS (FQXZ)

The devices listed in this section are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, Dumbwaiters, and Escalators and Moving Walks (ANSI/ASME A17.1).

Elevator hoist way door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoist way door is locked in the closed position, and to prevent the opening of the hoist way door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

Retiring cams are not covered by these listings, and their acceptability must be determined at the point of installation by the authority having jurisdiction.

Elevator hoist way door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoist way door is in the closed position, and to lock the hoist way door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone.

Elevator hoist way door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position.

The devices covered by these Listings are investigated for misalignment conditions when properly installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the authority having jurisdiction.

The basic standard used to investigate products in this category is UL104, "Elevator Door Locking Devices and Contacts".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Elevator Interlock", "Elevator Interlock Retiring Cam Required", "Elevator Combination Mechanical Lock and Electric Contact", "Elevator Electric Contact", or appropriate product names as shown in the individual Listings.

ELEVATOR OIL BUFFERS (FQZD)

These products are intended for installation under elevator cars having a rated speed in excess of 50 ft/min in order to stop a descending car beyond its normal limit of travel. They have been classified in accordance with the American National Safety Code For Elevators, Dumbwaiters, Escalators and Moving Walks (ANSI/ASME A17.1), paragraph 201.4g.

The basic standard used to investigate products in this category is UL104, "Elevator Door Locking Devices and Contacts".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®
IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD
SAFETY CODE FOR ELEVATORS, DUMBWAITERS, ESCALATORS
AND MOVING WALKS, ANSI/ASME A17.1 (DATE OF STANDARD)
PARAGRAPH 201.4g.
(CONTROL NUMBER)

ELEVATOR SWITCHES (FRAH)

The devices Listed in this section are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, Dumbwaiters, and Escalators and Moving Walks (ANSI-A17.1-1987).

These are elevator switches to be used with the elevator system car or shaft.

Elevator door locking devices and contacts and replacement parts for elevator door locking devices and contacts are covered under separate categories.

The basic standard used to investigate products in this category is UL104, "Elevator Locking Devices and Contacts".

The devices covered by these Listings are investigated for proper operation when installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the authority having jurisdiction.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and product identity ("Elevator Limit Switch", "Elevator Slack Cable Switch", as indicated in individual Listings etc.).

PASSENGER ELEVATOR CAR ENCLOSURES (FRBK)

Passenger elevator car enclosures classified under this category are factory-built assemblies of wall and ceiling panels intended to be secured to a car platform in accordance with the requirements of the Safety Code for Elevators and Escalators (ANSI/ASME A17.1).

These factory-built enclosures incorporate materials and equipment such as decorative panels, suspended ceilings, and light fixtures which, after installation, may not be accessible for inspection at the installation site.

These factory-built enclosures may be shipped disassembled.

This category does not include freight car enclosures, enclosures having glass panels in excess of 1 sq ft in area, enclosures having gates, weights, vertically sliding car doors, or padded linings for temporary use in passenger cars during the handling of freight.

These factory-built enclosures have been investigated in accordance with the applicable paragraphs of Section 204 of ANSI/ASME A17.1.

The Classification Marking for the elevator car enclosures appears on the upper surface of the top of the car enclosure. Each knock down part of the enclosure also bears a supplementary Classification Marking reading: "Knock down Enclosure Part for Classified Elevator Enclosure".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD
SAFETY CODE FOR ELEVATORS AND ESCALATORS
ANSI/ASME A17.1 (DATE OF STANDARD) SECTION 204

EMERGENCY LIGHTING AND POWER EQUIPMENT (FTBR)

USE

This category covers electrical emergency lighting and power equipment for use in accordance with NFPA 101, "Life Safety Code" and Article 700 of NFPA 70, "National Electrical Code."

Emergency lighting and power equipment has been evaluated for transferring operation from a normal (utility) supply source to an immediately available emergency supply source. Emergency lighting and power equipment is provided with a test switch and visible or audible indicators to report the readiness of the emergency supply.

PRODUCT TYPES

This category covers emergency luminaires, exit signs, unit equipment, inverters, central station battery systems, and related accessories that directly facilitate or supplement the function of these devices.

This category also includes inverter/charger packs intended for factory or field installation in UL Listed luminaires. These inverter/charger packs have been evaluated by UL to determine that when installed in accordance with the manufacturer's instructions they do not adversely affect the operation of the installed luminaire. Electrical ratings, lamp compatibility, and wiring diagrams are marked on the packs and/or identified in the instructions provided. Inverter/charger packs are not suitable for installation in sealed or gasketed compartments unless investigated and marked for such applications.

RATINGS

All products have been evaluated for use in dry locations only unless marked as suitable for damp or wet locations. Products marked as suitable for indoor damp or wet locations have not been evaluated for UV exposure. All products have been evaluated for use in ambient temperatures of 20 – 30°C (68 – 86°F) unless otherwise marked with an extended use temperature range.

Emergency lighting and power equipment with batteries has been determined to provide 90 minutes of rated power or light, in accordance with NFPA 101, unless specifically marked for a longer period of time.

Emergency luminaires have been evaluated for their ability to contribute to the required illumination of the path of egress, in accordance with NFPA 101. However, compliance with the lighting levels contemplated by NFPA 101 must be determined in the actual application.

Exit signs have been evaluated for visibility from 100 ft unless marked with a maximum viewing distance of 50 or 75 ft.

RELATED PRODUCTS

Exit signs intended for connection to a single source of power only are covered under Exit Fixtures (FWBO). Exit signs with no connection to a source of electrical power are Listed under Exit Signs, Self-luminous and Photoluminescent (FWBX).

Equipment intended to provide light or power when normal (utility) power is not available, but that has not been evaluated for compliance with the applicable provisions of NFPA 101, is covered under Lighting and Power Equipment, Auxiliary (OUST).

Kits intended to convert exit signs from one type of internal light source to another are covered under Exit Sign Conversion Kits (FWCF) or Exit Sign Retrofit Kits (GGET).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Emergency Lighting Equipment" or "Emergency Lighting and Power Equipment."

ENCLOSED BRANCH CIRCUIT CUTOUPS (FTOZ)

This listing covers enclosed branch circuit cutouts rated 60 amp or less and containing not more than twelve plug fuseholders.

Class CTL enclosed branch circuit cutouts are identified by the words "Class CTL" in Underwriters Laboratories Inc. Listing Mark.

Class CTL enclosed branch circuit cutouts incorporate physical features which, in conjunction with the physical size, configuration or other means provided on Class CTL plug fuseholders, are designed to prevent the installation of more over-current protective poles than that number for which the device is designed and rated.

Class CTL enclosed branch circuit cutouts are marked to indicate the specific type and makes of over-current protective units that are intended to be installed in the field.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed", a control number, and the following product name: "Enclosed Branch Circuit Cutout".

ENERGY USAGE MONITORING SYSTEMS (FTRZ)

USE

This category covers products intended for use in metering of utility and non-utility electric power. These devices monitor power consumption on a building main supply or separate branch circuits. These devices may communicate with other devices by means of power line carrier, satellite/radio frequency, telephone, cable or other means. Devices suitable for outdoor use are so marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 916, "Energy Management Equipment."

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of watt-hour meters for use in metering of utilities that not only meet the appropriate requirements of UL but also have been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI):

1. NEMA/ANSI C12.1-+, "Code for Electricity Metering"
2. IEEE/ANSI C12.11-+, "Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)"
3. IEEE/ANSI C12.13-+, "Electronic Time-of-Use Registers for Electricity Meters"
4. IEEE/ANSI C12.15-+, "Solid-state Demand Registers for Electromechanical Watt-hour Meters"
5. IEEE/ANSI C12.16-+ Solid-state Electricity Meters
6. NEMA/ANSI C12.20-+, "0.2 and 0.5 Accuracy Classes"

+ Issue date of standard or latest addendum

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Watt-hour Meter," "Energy Usage Monitor," "Sub-metering Equipment," or other appropriate product name.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with one or more of the standards or parts detailed below from the American National Standards Institute (ANSI). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following additional information: "Also Classified IN ACCORDANCE WITH *," where "*" is one of the texts detailed below:

1. NEMA/ANSI C12.1-+ Code for Electricity Metering
2. IEEE/ANSI C12.11-+ Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
3. IEEE/ANSI C12.13-+ Electronic Time-of-Use Registers for Electricity Meters
4. IEEE/ANSI C12.15-+ Solid-state Demand Registers for Electromechanical Watt-hour Meters
5. IEEE/ANSI C12.16-+ Solid-state Electricity Meters

6. NEMA/ANSI C12.20-+ 0.2 and 0.5 Accuracy Classes
+ Issue date of standard or latest addendum

ENGINE GENERATORS (FTSR)

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel fueled internal combustion engines. The products are provided as integrated systems and may be intended for portable, permanent or mobile installations. The systems are arranged to facilitate installation and use in accordance with the National Electrical Code, NFPA 70.

Listed engine generators for recreational vehicles are judged to be in accordance with the requirements of American National Standard A198.1, "Safety Standard for Engine Generator Sets for Recreational Vehicles."

Listed stationary engine generator assemblies are rated 600 V or less and are intended for installation and use in ordinary locations in accordance with the National Electrical Code; NFPA 37, "Standard for Installation and Use of Stationary Combustion Engines and Gas Turbines"; NFPA 99, "Standard for Health Care Facilities"; and NFPA 110, "Standard for Emergency and Standby Power Systems."

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1248, "Engine Generator Assemblies for Use in Recreational Vehicles" and UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Engine Generator for Recreational Vehicles," "Engine Generator for Emergency Use," "Engine Generator for Standby Use," "Engine Generator for Prime Power Use," "Engine Generator for Portable Use," "Engine Generator for Co-generation Use" or "Stationary Engine Generator Assembly."

EQUIPMENT GROUND-FAULT PROTECTIVE DEVICES (FTTE)

This category covers Equipment Ground-Fault Protective Devices (EGFPD) which operate to disconnect the electric circuit from the source of supply when ground-fault current exceeds the ground-fault pick-up level marked on the device.

To aid the user in making proper selection of this equipment, the EGFPDs are marked with a ground-fault pick-up level in milliamperes and with a voltage and current rating. The ground-fault pick-up level is limited to the range above 6 mA to 50 mA. These devices are intended to operate upon a condition of excessive ground-fault leakage current from equipment, rather than minimize damage due to arcing faults in services.

EGFPDs are intended to be installed only on grounded alternating-current systems in accordance with the National Electrical Code ANSI/NFPA-70.

EGFPDs are intended for use in applications where ground-fault protection of equipment is required by the National Electrical Code, specifically Sections 426-28 and 427-22, or where such protection is deemed appropriate.

A two-wire device is not suitable for use in a multiwire branch circuit as defined in the National Electrical Code.

The devices covered by this category have not been evaluated to provide electric shock protection for personnel and they are not intended to be used in place of a ground-fault circuit interrupter (GFCI) where a GFCI is required by the National Electrical Code. See Ground-Fault Circuit Interrupters (KCXS) for further information.

The devices covered by this category are not intended to be used in electrical service entrance equipment where ground-fault sensing and relaying equipment, required by Section 230-95 of the National Electrical Code, is used. See Ground-Fault Sensing and Relaying Equipment (KDAX) for further information.

The basic standard used to investigate products in this category is UL 1053, "Ground-Fault Sensing and Relaying Equipment." Some requirements are also derived from UL 943, "Ground-Fault Circuit-Interrupters."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Equipment Ground-Fault Protective Device" or "EGFPD."

EXIT FIXTURES (FWBO)

GENERAL

This category covers fixtures or recessed fixtures intended to be connected to a single source of power and to illuminate an integral legend "EXIT." They are intended for installation in accordance with NFPA 70, "National Electrical Code" and NFPA 101, "Life Safety Code."

Exit fixtures have been determined to comply with the applicable NFPA 101 requirements only when all internal lamps are illuminated. Each fixture is marked to indicate the type of lamp(s) or replacement lamp(s) to be used. Fixtures intended for mounting to a ceiling are suitable for use where the ceiling has thermal or acoustic insulation above it.

Exit fixtures are for use in indoor dry locations only, unless marked "Suitable for Damp Locations," "Suitable for Indoor Wet Locations" or "Suitable for Wet Locations." Exit fixtures marked for indoor wet locations have not been evaluated by UL with regard to UV (sunlight) exposure.

Exit fixtures containing fluorescent or electroluminescent lamps, and marked as suitable for damp, indoor wet, or wet locations, have been evaluated for use only at or above the marked minimum ambient temperature. Exit fixtures containing electroluminescent lamps are additionally marked with a lamp replacement date, of either 5 or 8 years after the date of manufacture.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc., on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exit Fixture."

EXIT SIGNS CLASSIFIED IN ACCORDANCE WITH LOCAL JURISDICTIONAL CODES (FWBW)

This category covers exit signs (fixtures and lights) that have been investigated and found in compliance with specific municipal or other local jurisdictional codes. These exit signs also comply with the applicable requirements of UL 924 except where there is a direct conflict with the local code. See FWBO (Exit Fixtures) and FTBR (Exit Lights) for additional information regarding exit signs Listed in accordance with UL 924.

These products are intended for ordinary location installation in accordance with the National Electrical Code, ANSI/NFPA-70, the Life Safety Code, ANSI/NFPA-101, and the local jurisdictional code(s) as noted on the Classification Mark.

Exit fixtures are intended to be connected to a single source of power and have been determined to comply with the applicable ANSI/NFPA-101 requirements only when all internal lamps are illuminated. Exit lights are either for simultaneous connection to normal and emergency power circuits, or have integral batteries for providing emergency power.

All products under this category are for use in indoor dry locations only, unless marked "Suitable for Damp Locations," "Suitable for Indoor Wet Locations," or "Suitable for Wet Locations." Products marked for indoor wet locations have not been evaluated by UL with regard to UV (sunlight) exposure.

Exit lights marked as suitable for damp, indoor wet, or wet locations have been evaluated for use only within their marked temperature range. Products containing batteries and intended for indoor dry location use only have been evaluated only for use in an ambient of 20-30 C (68-86 F).

Exit fixtures containing fluorescent or electroluminescent lamps, and marked as suitable for damp, indoor wet, or wet locations, have been evaluated for use only at or above the marked minimum ambient temperature.

Exit signs containing electroluminescent lamps are additionally marked with a lamp replacement date, of either 5 or 8 years after the date of manufacture.

The basic standards used to investigate products in this category are the specific jurisdictional code provisions as noted on the Classification Mark and, where there is no conflict, UL 924, Standard for Emergency Lighting and Power Equipment.

Where there is no conflict, and where eligible, these products may also be provided with the UL Listing Mark for Exit Fixtures (FWBO) or Emergency Lighting and Power Equipment (FTBR), as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.

The Classification marking consists of (1) the UL symbol, (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), (3) "Exit Sign", (4) "IN ACCORDANCE WITH _____", and (5) a control number.

+ - The name of the jurisdiction and the specific code reference with issue date.

For those products which are also Listed, the Classification Marking may be combined with the appropriate Listing Mark.

EXIT SIGN CONVERSION KITS (FWCF)

These exit sign conversion kits are parts and/or subassemblies intended for field installation in specific Listed Exit Fixtures (FWBO) or Exit Lights (FTBR). They convert the light source from one type to another (e.g., incandescent to LED), primarily for energy-saving purposes. They have been evaluated by UL to verify that the converted exit sign retains visibility comparable to and does not otherwise adversely affect the operation of the original sign. Their use is subject to the conditions indicated on the installation instructions provided with the kit.

Conversion kits are of one of the following type designations:

Type EFS (Exit Fixture Specific) — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions.

Type ELS (Exit Light Specific) — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions.

Exit sign conversion kits are for use in ordinary indoor dry locations, unless marked "Suitable for Wet Locations", "Suitable for Indoor Wet Locations", or "Suitable for Damp Locations". See Guide FTBR.

Exit sign conversion kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not less than that marked on the product.

These kits are intended for installation into UL Listed products that bear the product identity of "Exit Fixture" (for type EFS) or "Emergency Lighting Equipment" (for type ELS) as part of the Listing Mark.

The basic standard used to investigate the exit sign conversion kits is UL 924, "Standard for Emergency Lighting and Power Equipment."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service. The Classification Marking consists of (1) the UL symbol, (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), (3) a control number, and (4) the phrase: "Exit Sign Conversion Kit, Type _____ + _____, for use only with EXIT _____

++ _____ Model _____ (*) _____ Manufactured by _____

+ - "EFS" or "ELS"

++ - "Fixture" (for type EFS) or "Light" (for type ELS)

(*) - Additional model/manufacturer combinations may be noted.

EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT (FWCN)

These exit fixture to exit light conversions are parts and/or subassemblies intended for field installation in specific Listed exit fixtures identified by catalog numbers and company name. They are retrofit devices to convert specific exit fixtures to exit lights with integral battery providing emergency power, and may also convert the light source from one type to another (e.g., incandescent to light emitting diodes) when installed in accordance with the manufacturer's instructions.

These conversions have been investigated by UL to determine that when used in accordance with the manufacturer's instructions, the converted exit fixture complies with the applicable requirements for exit lights.

The basic standard used to investigate the exit fixture to exit light conversions is UL 924, "Emergency Lighting and Power Equipment."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.

CLASSIFIED BY

UNDERWRITERS LABORATORIES INC.

EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT

FOR USE ONLY WITH EXIT FIXTURE

MODEL _____ MANUFACTURED BY _____

EXIT SIGN RETROFIT KITS (GGET)

These exit sign retrofit kits are parts and/or subassemblies intended for field installation in Listed Exit Fixtures (FWBO) or Listed Exit Lights (FTBR) employing not more than two light sources. They convert the light source from one type to another (e.g., incandescent to LED), primarily for

energy-saving purposes. They have been evaluated by UL to verify that the converted exit sign retains visibility comparable to and does not otherwise adversely affect the operation of the original sign. Their use is subject to the conditions indicated on the installation instruction provided with the kit.

Retrofit kits are one of the following type designations:

Type EFG (Exit Fixture General) - A retrofit kit intended for use only in single or double faced stencil exit fixtures having a legend not exceeding 6 inches (152 mm) in height. Replacement diffusers are included. Type EFG kits are suitable for use with UL Listed exit fixtures of the following interior dimensions: 6-1/4 to 8-7/8 inches high, 9-1/2 to 13-7/16 inches wide, and 7/8 - 3-1/4 inches deep.

Type EFI (Exit Fixture Independent) - A retrofit kit which includes a light source, light reflecting media enclosure, diffuser, legend, and two directional indicators, intended to retrofit any UL Listed exit fixture having a legend not exceeding 6 inches (152 mm) in height. Type EFI kits are self-contained assemblies which are independent of the original exit fixture except for mechanical support and electrical supply.

Type ELG (Exit Light General) - Same as Type EFG except intended for use only in UL Listed exit lights which are energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

Type ELI (Exit Light Independent) - Same as Type EFI except intended for use Listed exit lights energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

These devices have not been evaluated as replacement light sources in edge illuminated exit signs.

Exit sign retrofit kits are for use in ordinary indoor dry locations, unless marked "Suitable for Wet Locations", "Suitable for Indoor Wet Locations", or "Suitable for Damp Locations." See Guide FTBR.

Exit sign retrofit kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not less than that marked on the product.

These kits are intended for installation into UL Listed products that bear the product identity of "Exit Fixture" (for type EFG or EFI) or "Emergency Lighting Equipment" (for type ELG or ELI) as part of the Listing Mark.

The basic Standard used to investigate the exit fixture retrofit kits is UL 924, "Standard for Emergency Lighting and Power Equipment".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriter's Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking consists of (1) the UL symbol, (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), (3) a control number, and (4) the phrase: "Exit Sign Retrofit Kit, Type _____ + _____, for use only with Exit _____ + Model _____ * Manufactured by _____."

+ - EFG, EFI, ELG, or ELI

++ - "Fixture" (for types EFG and EFI) or "Light" (for Types ELG and ELI)

(*) - Additional model/manufacture combinations may be noted.

FACTORY AUTOMATION EQUIPMENT (GPNY)

This category covers Listed production equipment for attended or unattended assembly of products or subassemblies. Equipment in this category is designed to be programmed for a specific manufacturing application, such as assembly of components, packaging, sorting, or counting of parts, or hole punching or cutting. The equipment may also incorporate manufacturing processes involving heating or cooling, drying, or gluing of parts, and is intended to be installed in accordance with NFPA 70, National Electrical Code, and NFPA 79, Industrial Machinery.

Robotics and associated control equipment are covered under Robots and Robotic Equipment, Industrial (TETZ). Industrial Control Panels are covered under their own category (NITW).

Equipment intended primarily for identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing and quality-control procedures are listed in the Electrical Appliance and Utilization Equipment Directory under Inspection and Measuring Equipment (NYRW).

Devices included in this category are not intended for the handling of hazardous materials in unattended applications. Devices included in this category are not intended for fire protection service.

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-

tory) together with the word "LISTED", a control number, and the product name, "Factory Automation Equipment."

FAN SPEED CONTROLLERS (GQHG)

This Listing covers semiconductor, capacitive type, and inductive type fan speed controls for regulating the speed of the motor of a fan. In some cases the devices also control the starting and stopping of the fan motor. Fan speed controls are for use only with single or multiple fans in parallel where the total controlled load is not in excess of the rating of the controller. Controls marked "Ceiling Fan" or "Paddle Fan" are only intended for use with one or more fans of this type. Controls marked "General Use" are intended to be used with any motor driven fan, including ceiling suspended fans, as permitted by instructions provided with the fan.

Fan speed controls using semiconductors for regulation are marked "Solid-State Fan Speed Control". Fan speed controls using capacitors or inductors for speed control may be marked to indicate the method of speed control.

These products may be outlet box mounted, cord and plug connected, or intended for mounting in the fan canopy. Cord and plug connected controls are intended for control of cord and plug connected fans only.

The basic standard used to investigate products in this category is UL1917, "Solid-State Fan Speed Controls".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fan Speed Control" or "Solid-State Fan Speed Control" as appropriate.

FC CABLE (GQKT)

USE AND INSTALLATION

This category covers Type FC cable which is an assembly of three or four parallel 10 AWG special stranded copper wires formed integrally with an insulating material web. Type FC cable is intended for installation in accordance with Article 322 of NFPA 70, "National Electrical Code."

The cable is marked with the size of the maximum branch circuit to which it may be connected, the cable type designation, manufacturer's identification, maximum working voltage, conductor size and temperature rating.

Type FC cable is not intended to be installed outdoors or in wet or damp locations unless identified for use in wet locations.

A marking accompanying the cable on a tag or reel indicates the special metal raceways and specific FC cable fittings with which the cable is intended to be used. Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "FC Cable."

FC CABLE FITTINGS (GQRS)

This listing covers power tap and cable termination fittings for use with FC cable installed in accordance with Article 363 of the National Electrical Code.

A fitting is suitable for use only with cables which are identified for use with that fitting.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory) together with the word "LISTED," a control number and one of the following product names as appropriate: "FC Cable Fittings", "FC Fittings".

**FIBER OPTIC CABLES CLASSIFIED FOR
FIRE AND SMOKE CHARACTERISTICS
(GRHT)**

Fiber Optic cable covered in this category, is intended for use in air handling ducts, hollow spaces used as ducts, and plenums in accordance with the Exception to Section 770-7 of the National Electrical Code.

Products classified under this category exhibit peak optical densities of 0.5 or less, average optical density of 0.15 or less and maximum flame-spread distances of 5 feet or less when tested according to Underwriters Laboratories Inc.'s Standard for a Test Method For Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air-Handling spaces (UL910).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
AS TO FIRE AND SMOKE CHARACTERISTICS ONLY
(IN ACCORDANCE WITH SECTION
770-7 OF THE NATIONAL ELECTRICAL CODE).**

FIRE ALARM CABLE (HNGV)

Fire Alarm cable is intended for use in accordance with Article 760 of the National Electrical Code.

**NONPOWER LIMITED FIRE ALARM CABLE
(HNHT)****USE AND INSTALLATION**

This category covers nonpower limited fire alarm cable for use in nonpower limited circuits in accordance with Section 760.30 of NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, nonpower limited fire alarm cable is intended for use where the operating temperature does not exceed 60°C. The marked voltage rating is 150 V.

PRODUCT MARKINGS

Nonpower limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

NPLF — Indicates cable intended for use within buildings in accordance with Section 760.30(B)(4) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

NPLFR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.30(B)(3) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

NPLFP — Indicates cable intended for use within buildings in other spaces used for environmental air in accordance with Section 760.30(B)(2) of the NEC. This cable exhibits a maximum peak optical density of 0.50, a maximum average optical density of 0.15, and a maximum flame spread distance of 5.0 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable marked "CI (max voltage ____)" is suitable for use as circuit integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.31(F) of the NEC.

ADDITIONAL INFORMATION

For additional information, see Fire Alarm Cable (HNGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1425, "Cables for Nonpower Limited Fire Alarm Circuits."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as

illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonpower Limited Fire Alarm Cable."

**POWER LIMITED FIRE ALARM CABLE
(HNIR)****USE AND INSTALLATION**

This category covers power limited fire alarm cable for use in power limited circuits in accordance with Article 760 of NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, power limited fire alarm cable is intended for use where operating temperature does not exceed 60°C. The voltage rating is 300 V but is not marked.

PRODUCT MARKINGS

Power limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

FPL — Indicates cable intended for use within buildings in accordance with Section 760.61(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

FPLP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 760.61(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

FPLR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

Power Limited Fire Alarm Cable — Indicates cable suitable for use within buildings (1) where the cable is enclosed in a raceway, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, in accordance with Sections 760.61(C)(2) and (3) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Listed Type FPLP cable that is additionally marked "Also Classified NYC CERT Fire Alarm Cable" has been evaluated in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "CI (max voltage ____)" is suitable for use as circuit integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.71(G) of the NEC.

ADDITIONAL INFORMATION

For additional information, see Fire Alarm Cable (HNGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1424, "Cables for Power-Limited Fire-Alarm Circuits."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Limited Fire Alarm Cable."

In addition, the Listing Mark for cable also Classified for use in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York includes the statement "Also Classified for Use as Fire Alarm Cable in New York City."

**FIRE PROTECTIVE SIGNALING CABLE,
POWER LIMITED, CLASSIFIED FOR FIRE
AND SMOKE CHARACTERISTICS (HNIW)**

Power limited fire protective signaling cable covered in this category, is intended for use in air handling ducts, hollow spaces used as ducts, and plenums in accordance with the Exception to Section 760-4(d) of the National Electrical Code.

Products classified under this category exhibit peak optical densities of 0.5 or less, average optical density of 0.15 or less and maximum flame-

spread distances of 5 feet or less when tested according to Underwriters Laboratories Inc.'s Standard for a Test Method For Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air-Handling Spaces (UL910).

In addition, these cables are Listed under the category Power Limited Fire-Protective Signaling Cables, (HNIR).

The basic standard used to investigate products in this category is UL723, "Tests for Surface Burning Characteristics of Building Materials".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC. ®
AS TO FIRE AND SMOKE CHARACTERISTICS ONLY (IN
ACCORDANCE**

WITH SECTION 760-4(d) OF THE NATIONAL ELECTRICAL CODE).

LUMINAIRES AND FITTINGS (HYXT)

This category covers complete luminaires (also known as lighting fixtures) intended for general and special purpose illumination and component fittings and retrofits intended for field assembly to or into complete units.

SPECIAL USE LUMINAIRES

COOKING HOOD LUMINAIRES — Luminaires for use in nonresidential occupancies in exhaust ducts or hoods above cooking equipment are marked "SUITABLE FOR USE WITHIN COMMERCIAL COOKING HOODS" and "MOUNT A MINIMUM OF 1.2 M (4 FT) ABOVE COOKING SURFACE." Such luminaires are for installation in accordance with the Standard for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment (NFPA 96), and in accordance with the National Electrical Code, Section 410-4(c).

Recessed cooking hood luminaires are additionally marked with a minimum spacing marking "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: _____ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: _____ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: _____ INCHES." The recessed cooking hood is to be installed in a hood that maintains these minimum spacings.

AIR HANDLING LUMINAIRES — Luminaires suitable for air handling use are marked "SUITABLE FOR AIR HANDLING USE." For information on the use of air handling luminaires in fire-rated ceiling constructions, reference should be made to the design information section in the Fire Resistance Directory (BXUV). For applicable requirements covering air handling installations, reference should be made to the National Fire Protection Association Standard for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type (NFPA 90A).

Some recessed air handling luminaires are restricted to certain applications because of certain features and are marked as follows: "VENTILATING OR COOLING AIR ONLY," "ONLY FOR USE IN CEILING PLENUM OF NONCOMBUSTIBLE CONSTRUCTION OR WITH AIR HANDLING PARTS THAT COVER VENT OPENINGS" or "INSTALL ONLY IN ENVIRONMENTAL AIR HANDLING SPACES WHERE A COMPLETE METAL ENCLOSED WIRING SYSTEM IS PROVIDED."

FIRE RESISTANT LUMINAIRES — Luminaires for recessed installation in ceilings that have been shown to provide a degree of fire resistance with the floor or roof assembly with which they have been tested are Classified under Fluorescent Recessed Fixtures Classified for Fire Resistance (CCSR) in the Fire Resistance Directory.

EMERGENCY LIGHTING — Luminaires intended for simultaneous connection to normal and emergency power circuits, as well as luminaires with integral batteries for emergency illumination, are Listed under Emergency Lighting and Power Equipment (FTBR).

EXIT LIGHTING — Luminaires that illuminate an integral legend "Exit" and are intended for installation in accordance with the National Electrical Code, ANSI/NFPA-70 and the Life Safety Code, ANSI/NFPA-101 are Listed under Exit Fixtures (FWBO).

ELECTRIC SIGNS — Products that illuminate an integral legend other than "Exit" are Listed under Signs (UXYT).

SUNTAN LAMPS — Lighting products that employ suntan lamps are Listed under Sun and Heat Lamps (QPDY) or Personal Sun and Heat Equipment (QGRX).

SUBMERSIBLE FIXTURES — Luminaires intended for installation under water in accordance with Article 680 of the National Electrical Code are Listed as Submersible Luminaires (IFEV) if intended for decorative fountains and similar locations, or as Fixtures, Lighting and Fixture Housings (WBDD) if intended for installation in swimming pools and similar locations.

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

LUMINAIRE INSTALLATION MARKINGS

Unless otherwise indicated under the category for a specific type of luminaire, all luminaires are marked indicating the location where they can be used:

A luminaire marked "DRY LOCATIONS ONLY" is to be installed in indoor dry locations.

A luminaire marked "SUITABLE FOR DAMP LOCATIONS" may be installed in a damp or dry location.

A luminaire marked "SUITABLE FOR WET LOCATIONS" may be installed in a wet, damp, or dry location.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) at the front of this Directory and in the National Electrical Code.

Luminaires evaluated for or restricted to a particular mounting location for suitability to wet locations are additionally marked "SUITABLE FOR MOUNTING WITHIN 1.2 M (4 FT) OF THE GROUND," "SUITABLE FOR GROUND-MOUNTED RECESSED," "LIMIT RANGE OF ADJUSTMENT TO (instruction)" or "COVERED CEILING MOUNT ONLY."

Luminaires evaluated for or restricted to a particular mounting location are marked "WALL MOUNT ONLY," "FOR CEILING MOUNTING ONLY" or "MOUNTING ORIENTATION" (such as "This End Up").

Luminaires are marked with a supply wire temperature rating "MIN _____ C SUPPLY CONDUCTORS," if intended for greater than 60°C supply wiring. Luminaires rated for over 90°C supply wiring are additionally marked "NOT FOR USE IN DWELLING."

Luminaires that include an integral raceway intended to comply with Exception No. 1 of Section 410-31 of the National Electrical Code are marked "SUITABLE FOR USE AS RACEWAY" and are additionally marked to include the maximum number, size and type of conductors they are intended to accommodate. See Surface Metal Raceways (RJBT) for raceways that can be assembled and installed as lighting units.

Some luminaires are only suitable for use with specific lamp types and are so marked. However, luminaires are not evaluated or intended for use with sun lamps.

Luminaires containing components that require the luminaire to be connected only to an alternating current circuit are marked "60 Hz" or "AC ONLY."

Luminaires designed for connection to a proprietary wiring system are to specify the name and part number of the proprietary system and all cautionary or other markings required for the system. These systems are Listed under Manufactured Wiring Systems (QQVX) in the Electrical Appliance and Utilization Equipment Directory.

Luminaires designed for connection to other than nominal 120 V supply and/or a 2-wire branch circuit are marked to identify the voltage supply or type of branch circuit or both.

REQUIREMENTS

On January 31, 2001, the Standard for Luminaires (UL 1598) will replace the Standards for Fluorescent Lighting Fixtures (UL 1570), Incandescent Lighting Fixtures (UL 1571) and High Intensity Discharge Lighting Fixtures (UL 1572).

FIXTURES, STAGE TYPE (IDDX)

The basic standard used to investigate products in this category is UL1573, "Stage and Studio Lighting Units".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Stage Fixture", "Stage Border Light", "Stage Fixture Accessory" or other appropriate product name.

FIXTURES, SUBMERSIBLE (IDRV)

Submersible fixtures are intended for installation in fountains and similar locations below the surface of the water in accordance with Article 680 of the National Electrical Code. For listings of lighting fixtures intended for use in swimming pools see "Swimming Pool Equipment; Fixtures, Lighting, and Fixture Housings."

Means for grounding are provided on the fixture.

Wet-niche submersible fixtures are intended to be removable for servicing, without lowering the water level.

Dry-niche submersible fixtures are intended to be sealed into underwater walls in such a manner that supply connections can be made in a dry niche behind the fixture.

Special-use submersible fixtures may rest directly on the fountain floor or may be otherwise located under the water level. They are provided with flexible cord or equipped for conduit connection.

Flexible cords for submersible fixtures are of Type ST or SO which have been investigated for water resistance.

The basic standard used to investigate products in this category is UL676, "Underwater Lighting Fixtures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Submersible Fixture," "Submersible Fixture Wet-Niche Type," "Submersible Fixture Dry-Niche Type" or other appropriate product name.

FIXTURE FITTINGS (IEFT)

Fixture fittings are incomplete parts and/or subassemblies of fixtures intended for final assembly into fixtures in the field as identified on the installation instructions that accompany each fitting.

For additional information, see Fixtures and Fittings, HYXT.

Each fitting bears the Listing Mark.

The basic standards used to investigate products in this category are UL1570, "Fluorescent Lighting Fixtures"; UL1571 "Incandescent Lighting Fixtures"; and UL1572 "High Intensity Discharge Lighting Fixtures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fixture Fitting", or other appropriate product name.

LUMINAIRES AND FITTINGS, SPECIAL PURPOSE, MISCELLANEOUS (IETR)

USE

This category covers special purpose luminaires and fittings that are parts and/or subassemblies of special purpose luminaires that are intended for final assembly into special purpose luminaires in the field.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKING

All luminaires and fittings are marked in combination with the UL Listing Mark indicating the location where they can be used:

A luminaire or fitting marked "DRY LOCATIONS ONLY" is intended to be installed in indoor, dry locations.

A luminaire or fitting marked "SUITABLE FOR DAMP LOCATIONS" is intended to be installed in a damp or dry location.

A luminaire or fitting marked "SUITABLE FOR WET LOCATIONS" is intended to be installed in a wet, damp or dry location.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Miscellaneous Luminaire," "Floodlight," "Inspection Light" or other appropriate product name.

LUMINAIRES (IETX)

This category covers complete luminaires intended for general and special purpose illumination and component fittings and retrofits intended for field assembly to or into complete units.

SPECIAL USE LUMINAIRES

Luminaires for recessed installation in ceilings that have been shown to provide a degree of fire resistance with the floor or roof assembly with which they have been tested are covered under Luminaires Classified for Fire Resistance (CDHW) Fire Resistance Directory.

Luminaires intended for simultaneous connection to normal and emergency power circuits, as well as luminaires with integral batteries for emergency illumination, are covered under Emergency Lighting and Power Equipment (FTBR).

Luminaires for use in nonresidential occupancies in exhaust ducts or hoods above cooking equipment are marked "For Use Within Commercial Cooking Hoods" or the equivalent. Such luminaires are for installation in accordance with NFPA 96, "Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment," and in accordance with the National Electrical Code, NFPA 70, Section 410-4(c).

Luminaires suitable for air handling use are marked "Suitable for Air Handling Use." For information on the use of air handling luminaires in fire-rated ceiling constructions, reference should be made to the design information section in the Fire Resistance Directory. For applicable requirements covering air handling installations, reference should be made to NFPA 90A, "Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type."

Luminaires that illuminate an integral legend "Exit" and are intended for installation in accordance with the National Electrical Code, NFPA 70, and the Life Safety Code, NFPA 101, are covered under Exit Fixtures (FWBO).

Products that illuminate an integral legend other than "Exit" are covered under Signs (UXYT).

Lighting products that employ suntan lamps are covered under Sun and Heat Lamps (QPDY) or Personal Sun and Heat Equipment (QGRX).

Luminaires intended for installation under water in accordance with Article 680 of the National Electrical Code are covered under Submersible Luminaires (IFEV) if intended for decorative fountains and similar locations, or as Fixtures, Lighting and Fixture Housings (WBDT) if intended for installation in swimming pools and similar locations.

LUMINAIRE INSTALLATION MARKINGS

Luminaires that include an integral raceway intended to comply with Exception No. 1 of Section 410-31 of the National Electrical Code are marked in combination with the Listing Mark "Suitable for Use as Raceway" and are additionally marked to include the maximum number, size, and type of conductors they are intended to accommodate. See Surface Metal Raceways (RJBT) for raceways that can be assembled and installed as lighting units.

Pole mounted luminaires not provided with means for the physical support of the incoming supply conductors are marked "Do not install on a pole that results in a vertical rise of 100 feet or higher" in accordance with the National Electrical Code, Section 300-19.

Some luminaires are only suitable for use with specific lamp types and are so marked. However, luminaires are not evaluated or intended for use with sun lamps.

Luminaires evaluated for or restricted to a particular mounting location are marked "For wall mounting only," "For under cabinet mounting only," "For ceiling mounting only" or "For covered ceiling mounting."

Unless otherwise indicated under the category for a specific type of luminaire, all luminaires are marked adjacent to the UL Listing Mark indicating the location where they can be used:

A luminaire marked "Suitable for Dry Locations Only" is to be installed in indoor dry locations.

A luminaire marked "Suitable for Damp Locations" may be installed in a damp or dry location.

A luminaire marked "Suitable for Wet Locations" may be installed in a wet, damp, or dry location.

The locations are defined in the National Electrical Code and in Electrical Equipment for Use in Ordinary Locations (AALZ).

Luminaires containing components that require the luminaire to be connected only to an alternating current circuit are marked "60 Hz only" or "AC only."

Luminaires designed for connection to a proprietary wiring system are marked specifying the name and part number of the proprietary system and all cautionary or other markings required for the system. These systems are covered under Manufactured Wiring Systems (QQVX) in the Electrical Appliance and Utilization Equipment Directory.

Luminaires designed for connection to other than nominal 120 V supply and/or a 2-wire branch circuit are marked to identify the voltage supply or type of branch circuit or both.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

LUMINAIRE CONVERSIONS, RETROFIT (IEUQ)

USE AND INSTALLATION

This category covers retrofit devices or kits consisting of parts and/or subassemblies intended for field installation in UL Listed luminaires, office furnishing lights or portable lamps. These products have been evaluated by UL to determine that when used in accordance with the manufacturer's instructions they do not adversely affect the operation of the complete unit.

This category includes reflector kit retrofits and other retrofit devices. Reflector kits are intended to be used to add or replace reflectors in fluorescent lighting units and may also involve relocation, removal or replacement of wiring, lampholders and ballasts. Reflector kits are not to be installed on luminaires used as air handling registers unless the accompanying reflector kit installation instructions specify this combination as suitable.

RELATED PRODUCTS

Retrofit devices used to convert incandescent exit fixtures to fluorescent exit fixtures are covered under Exit Sign Conversion Kits (FWCF).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1598, "Luminaires," UL 1598B, "Supplemental Requirements for Lumi-

naire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires" and UL 153, "Portable Electric Lamps."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for retrofit devices that are reflector kits includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "Luminaire Conversion, Retrofit FOR USE ONLY WITH + IDENTIFIED IN MANUFACTURER'S INSTRUCTIONS," and a control number.

The Classification Mark for retrofit devices that are other than reflector kits includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "Luminaire Conversion, Retrofit (*WITH RESPECT TO (nature of hazard) ONLY), FOR USE WITH (+identification of unit with which retrofit is to be used) ONLY," and a control number.

+ – Replace with appropriate wording: "Fluorescent Luminaires," "Incandescent Luminaires," "HID Luminaires," "Office Furnishing Luminaires" or "Portable Luminaires."

The parenthetical information identified by the * is provided only if found applicable by Underwriters Laboratories Inc. The parenthetical information identified with the + is always provided.

LUMINAIRE POLES (IEUR)

USE

This category covers poles for support of luminaires in accordance with Article 410 of the National Electrical Code. Included are poles that exceed 12 feet in length – measured from the bottom of the base, or from the intended grade level of poles for installation partially in ground. The poles are investigated with respect to suitability of the enclosure for supply conductors, provision of equipment grounding and bonding means, and a means of access to wiring.

Poles Classified under this category have not been evaluated for mechanical strength or wind loading.

Poles are evaluated for use in wet locations.

PRODUCT MARKING

Poles that are greater than 25 feet in length and not provided with conductor support are marked "FOR USE ONLY WITH A LUMINAIRE WITH INTEGRAL CONDUCTOR SUPPORT."

RELATED PRODUCTS

Poles that do not exceed 12 feet in length are Listed under Luminaire Fittings (IFFX).

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by UL to identify products under its Classification and Follow-Up Service.

LUMINAIRE POLE

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
WITH RESPECT TO ELECTRICAL HAZARDS ONLY —
— NOT FOR MECHANICAL STRENGTH OR
WIND LOADING
(Control Number)

FLUORESCENT LAMP TYPE LUMINAIRES (IEUT)

This category covers surface and recessed luminaires containing only fluorescent lamps or fluorescent and incandescent lamps. Luminaires that contain HID lamps in combination with fluorescent lamps are Listed under HID Lamp Type Luminaires (IEWX).

All luminaires employ a Class P thermally protected ballast except that luminaires intended for use with straight tubular lamps and/or marked for "OUTDOOR USE ONLY" incorporate a Class P thermally protected or a non-Class P ballast of the simple reactance type.

For additional information see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low Voltage Luminaires for Recreational Vehicle Use (IFDQ).

Luminaires intended for use with germicidal lamps (germicidal lamps should not be used in ordinary luminaires) are marked "THIS LUMINAIRE IS DESIGNED FOR USE WITH GERMICIDAL LAMPS AND MUST BE INSTALLED IN COMPLIANCE WITH COMPETENT TECHNICAL DIRECTIONS SO THAT THE USER'S EYE AND BARE SKIN WILL NOT BE SUBJECTED TO INJURIOUS RAYS."

LUMINAIRE INSTALLATION MARKINGS

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency.

As an alternative to a marked volt-ampere rating, the luminaire line volt-amperes can be determined by the following markings: "FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 1.5" for luminaires with high power factor preheat or rapid start ballasts; "FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 2.5" for luminaires with low power factor preheat or rapid start ballasts; or "FOR LINE VOLT-AMPERES MULTIPLY ALL LAMPS IN INCHES BY ____" for luminaires with instant start ballasts and where the blank corresponds to a multiplying factor based on supply voltage.

Luminaires with a ballast output circuit voltage exceeding 1000 V are marked "NOT FOR USE IN DWELLING."

Luminaires intended to be field connected to a remote ballast are marked "USE BALLAST FOR ____ WATT ____ TYPE LAMP" and "USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS."

Luminaires are suitable for use with 60C field wiring unless (1) the field wiring is routed within 3 inches of the ballast, in which case 90C rated wire is to be used, or (2) the luminaire is marked with a supply wire rating.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

Fluorescent Surface Mounted Luminaires (IEUZ)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see Fluorescent Lamp Type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

LUMINAIRE INSTALLATION MARKINGS

All ceiling and wall mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked "WALL MOUNT ONLY" are not acceptable for mounting on ceilings and (2) luminaires marked "NON-COMBUSTIBLE SURFACE ONLY."

All luminaires provided with a power supply cord are intended for chain, hook, or similar suspension means only and are marked "FOR CHAIN OR HOOK SUSPENSION ONLY."

Luminaires intended for undercabinet mounting are marked "SUITABLE FOR UNDER-CABINET MOUNT."

Luminaires intended for continuous row mounting are marked "SUITABLE FOR CONTINUOUS ROW MOUNTING."

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked "THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Luminaire," and one of the following words adjacent to the Listing Mark: "Fluorescent," "Wired Fluorescent Channel" or "Wired Fluorescent Reflector."

Fluorescent Recessed Luminaires (IEVV)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

For additional information, see Fluorescent Lamp Type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked "TYPE IC" may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire.

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 inches from the sides of the luminaire and not

placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires.

CONCRETE ONLY LUMINAIRE — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"FOR USE IN CONCRETE ONLY."**

A Type IC or Non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked **"SUITABLE FOR USE IN POURED CONCRETE."**

SUSPENDED CEILING LUMINAIRE — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked **"SUITABLE FOR SUSPENDED CEILING."**

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been evaluated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."**

A ground-mounted recessed luminaire that is suitable for installation in non-fire resistant mediums such as a wooden deck is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED."**

LUMINAIRE INSTALLATION MARKINGS

A luminaire with an integral junction box or wiring compartment and evaluated for any heat contribution added by branch circuit conductors is marked **"MAXIMUM OF ____ NO. ____ AWG BRANCH CIRCUIT CONDUCTORS SUITABLE ____ C PERMITTED IN BOX."** A luminaire suitable for branch circuit conductors, but not for pulling wires through conduit is additionally marked **"FOR CABLE USE ONLY - NOT FOR PULLING WIRES."**

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked **"ACCESS ABOVE CEILING REQUIRED," "ACCESS BEHIND WALL REQUIRED"** or **"ACCESS NONCOMBUSTIBLE CEILING PLENUM ONLY."**

Luminaires that are provided with polymeric recessed housings are marked **"FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY"** and **"FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY."**

Luminaires that are provided with recessed housings with openings that do not close off the room side to ceiling opening are marked **"FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY."**

Luminaires that consist of 1) a luminaire housing and trims or 2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

- 1) For luminaire housing and trims, the housing is marked **"USE WITH (manufacturer's name) (catalog number) TRIMS"** and each trim is marked with the manufacturer's name and catalog number;
- 2) For rough-in and finishing sections, the rough-in section is marked **"ROUGH-IN SECTION FOR USE WITH FINISHING SECTION ____"** where the blank refers to the type or catalog number. The finishing section is marked in the same manner stating **"FINISHING SECTION FOR USE WITH ROUGH-IN SECTION ____"**

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, the product name **"Luminaire,"** and one of the following words adjacent to the Listing Mark: **"Recessed Fluorescent," "Recessed Fluorescent Channel," "Wired Recessed Fluorescent Luminaire Reflector," "Wired Recessed Fluorescent Channel" or "Wired Fluorescent Recessed Section."**

Fluorescent Suspended Ceiling Fixtures (IEVY)

This Listing covers suspended ceiling fixtures that are suitable for installation in suspended ceilings only.

Suspended ceiling fixtures are only intended to be installed in a suspended grid with elements such as acoustical tile or lay-in panels that are not fastened in place and are not part of the building structure. No allow-

ance has been made for any heat contributed by external heat sources in the ceiling area such as steam pipes, heating ducts, and the like.

For additional information, see Fluorescent Lamp Type Fixtures, IEUT and Fixtures, Lighting, IETX.

FIXTURE INSTALLATION MARKINGS

All fixtures and their cartons or shipping packages are marked **"Suitable for use in suspended ceilings only"**.

Fixtures that consist of separate 1) wired fixture sections or 2) channel and reflector are marked on each separable part with correlation markings:

For fixture sections, each section is marked in combination with the Listing Mark **"Wired Suspended Ceiling Fluorescent Fixture Section ____"**, For Use With **"Wired Suspended Ceiling Fluorescent Fixture Section ____"**

For channels and reflectors, each channel and reflector is marked with an identifying designation such as a style, catalog, or type number, and with information on the mating part or parts with which it is intended to be used.

The basic standard used to investigate products in this category is UL1570, "Fluorescent Lighting Fixtures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, and one of the following product names as appropriate: **"Suspended Ceiling Fluorescent Fixture," "Wired Suspended Ceiling Fluorescent Fixture Section," "Suspended Ceiling Fluorescent Fixture Channel," "Suspended Ceiling Fluorescent Fixture Reflector," "Wired Suspended Ceiling Fluorescent Fixture Channel," "Wired Suspended Ceiling Fluorescent Fixture Reflector."**

Light Diffusers and Lenses for Air Handling Luminaires, Fluorescent (IEWR)

This category covers light diffusers consisting of metal frames and panels of nonmetallic light diffusing material, other than glass. They are for use on luminaires that are designed to handle return air in a heating or air conditioning system. The method of mounting in the metal frame, the frame dimensions and the panel material used are so designed that the panel drops out of the frame under most fire conditions and, if the panel material ignites while in the frame, it will not propagate flame to adjacent light diffusers.

For additional information, see Fluorescent Lamp Type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, and the product name **"Light Diffuser for Air Handling Luminaires."**

HIGH INTENSITY DISCHARGE LAMP TYPE LUMINAIRES (IEWX)

This category covers surface and recessed lighting luminaires containing high intensity discharge lamps and may contain fluorescent and incandescent lamps.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

LUMINAIRE INSTALLATION MARKINGS

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency.

Luminaires intended to be field connected to a remote ballast are marked **"USE BALLAST FOR ____ WATT ____ TYPE LAMP"** and **"USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS."**

Luminaires intended for use with metal halide lamps and not provided with a suitable lamp containment barrier, are marked **"CAUTION - RISK OF FIRE, DO NOT USE A LAMP IDENTIFIED FOR USE IN ENCLOSED LUMINAIRES."**

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

High Intensity Discharge Surface Mounted Luminaires (IEXT)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see HID Lamp Type Luminaires (IEWX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient such as a boiler room, foundry, etc., are marked **"SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING ___ C,"** where the blank is filled in with the intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

All ceiling and wall mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked **"WALL MOUNT ONLY"** are not acceptable for mounting on ceilings and (2) luminaires marked **"NON-COMBUSTIBLE SURFACE ONLY."**

All luminaires provided with a power supply cord are intended for chain, hook, or similar suspension means only and are marked **"FOR CHAIN OR HOOK SUSPENSION ONLY."**

Luminaires intended for undercabinet mounting are marked **"SUITABLE FOR UNDER-CABINET MOUNT."**

Luminaires intended for continuous row mounting are marked **"SUITABLE FOR CONTINUOUS ROW MOUNTING."**

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked **"THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."**

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, the product name **"Luminaire,"** and one of the following words adjacent to the Listing Mark: **"HID"** or **"Wired HID Section."**

High Intensity Discharge Recessed Luminaires (IEXZ)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

For additional information, see HID Lamp Type Luminaires (IEWX) Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked **"TYPE IC"** may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire.

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 inches from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires.

Luminaires intended for marked spacing installation are marked **"INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___ INCHES."** The marked spacing luminaire is to be installed in a cavity that maintains these minimum spacings.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 inches from the luminaire and other structural support members may be in the cavity area above the luminaire provided (1) they are not closer than 1/2 inch from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked spacing luminaire may be installed in the same cavity provided the marked spacings are maintained from each luminaire to cavity sidewalls

and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

CONCRETE ONLY LUMINAIRE — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"FOR USE IN CONCRETE ONLY."**

A Type IC or Non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked **"SUITABLE FOR USE IN POURED CONCRETE."**

SUSPENDED CEILING LUMINAIRE — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked **"SUITABLE FOR SUSPENDED CEILING."**

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been evaluated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."**

A ground-mounted recessed luminaire that is suitable for installation in non-fire resistant mediums such as a wooden deck is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED."**

LUMINAIRE INSTALLATION INSTRUCTIONS

All recessed luminaires except those marked **"FOR USE IN POURED CONCRETE ONLY"** are marked **"BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."**

Luminaires that produce temperatures in excess of 90C at points of mounting to the building structure are marked **"INSTALL IN BUILDINGS OF FIRE-RESISTIVE CONSTRUCTION - MOUNT ON NON-COMBUSTIBLE MATERIAL."**

Only those luminaires with an integral junction box or wiring compartment marked in combination with the Listing Mark, **"MAXIMUM OF NO. ___ AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ C PERMITTED IN BOX,"** have been evaluated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked **"ACCESS ABOVE CEILING REQUIRED"** or **"ACCESS BEHIND WALL REQUIRED."**

Luminaires that are provided with polymeric recessed housings are marked **"FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY"** and **"FOR USE IN NON-FIRE RATED INSTALLATIONS."**

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

(1) For luminaire housing and trims, the housing is marked **"USE WITH (manufacturer's name) (catalog number) TRIMS"** and each trim is marked with the manufacturer's name and catalog number;

(2) For rough-in and finishing sections, the rough-in section is marked in combination with the Listing Mark, **"ROUGH-IN SECTION FOR USE WITH FINISHING SECTION,"** where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating **"FINISHING SECTION FOR USE WITH ROUGH-IN SECTION."**

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, the product name **"Luminaire,"** and one of the following words adjacent to the Listing Mark: **"Recessed HID," "Recessed HID Type IC," "Rough-In Section for Recessed HID," "Rough-In Section for Recessed HID Type IC," "Finishing Section for Recessed HID"** or **"Wired Recessed HID Section."**

INCANDESCENT LAMP TYPE LUMINAIRES (IEYV)

This category covers surface and recessed lighting luminaires containing only incandescent lamps. Luminaires that contain fluorescent or HID

lamps in combination with incandescent lamps are Listed under Fluorescent Lamp Type Luminaires (IEUT) and HID Lamp Type Luminaires (IEWX), respectively.

For additional information see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low Voltage Luminaires for Recreational Vehicle Use (IFDQ).

LUMINAIRE INSTALLATION MARKINGS

Luminaires provided with electrical loads other than lampholders directly connected to a 120 V, 2-wire branch circuit supply are marked with the total current rating for the luminaire excluding any convenience receptacle provided.

Luminaires provided with medium or mogul base lampholders were evaluated for use with Types A or PS lamps unless marked otherwise. Also, some luminaires are only suitable for use with specific lamp types and are so marked.

Luminaires intended for use with tungsten-halogen lamps and not provided with a suitable lamp containment barrier are marked **"CAUTION – RISK OF FIRE, DO NOT USE A LAMP IDENTIFIED FOR USE IN ENCLOSED LUMINAIRES."**

Luminaires are not intended for use with infrared or grow lamps unless so marked.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

Incandescent Surface Mounted Luminaires (IEZR)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires.

Ceiling-mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see Incandescent Lamp Type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient such as a boiler room, foundry, etc., are marked **"SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING ___ C,"** where the blank is filled in with intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

If the required rating of the field wiring supplying the luminaire requires the installer to push the supply conductors from the luminaire into the outlet box, the luminaire is marked **"PUSH CONDUCTORS INTO JUNCTION BOX."**

All ceiling and wall mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked **"WALL MOUNT ONLY"** are not acceptable for mounting on ceilings and (2) luminaires marked **"NON-COMBUSTIBLE SURFACE ONLY."**

Luminaires intended for undercabinet mounting are marked **"SUITABLE FOR UNDER-CABINET MOUNT."**

Luminaires intended for continuous row mounting are marked **"SUITABLE FOR CONTINUOUS ROW MOUNTING."**

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked **"THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."**

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word **"LISTED,"** a control number, the product name **"Luminaire,"** and the word **"Incandescent"** adjacent to the Listing Mark.

Incandescent Recessed Luminaires (IEZX)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

For additional information, see Incandescent Lamp Type Luminaires (IEYV), Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Recessed type luminaires suitable for optional use with infrared heating lamps are marked and rated for 250 watt reflector type lamps. Recessed

units suitable only for use with one or more infrared heating lamps are Listed under Air Heaters, Room, Fixed and Location-Dedicated (KKWS) in the Electrical Appliance and Utilization Equipment Directory.

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked **"TYPE IC"** may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire. Type IC luminaires are provided with thermal protection to deactivate the lamp should the luminaire be mislabeled.

INHERENTLY PROTECTED LUMINAIRE — A recessed luminaire which does not exceed temperatures greater than 90C on outside surfaces even when covered with insulation and mislabeled or overlapped is identified by being marked **"INHERENTLY PROTECTED."**

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 inches from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires.

Luminaires intended for marked spacing installation are marked **"INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___ INCHES."** The marked spacing luminaire is to be installed in a cavity that maintains these minimum spacings.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 inches from the luminaire and other structural support members may be in the cavity area above the luminaire provided (1) they are not closer than 1/2 inch from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked spacing luminaire may be installed in the same cavity provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

CONCRETE ONLY LUMINAIRE — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"FOR USE IN CONCRETE ONLY."**

A Type IC or Non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked **"SUITABLE FOR USE IN POURED CONCRETE."**

SUSPENDED CEILING LUMINAIRE — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked **"SUITABLE FOR SUSPENDED CEILING."**

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been evaluated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."**

A ground-mounted recessed luminaire that is suitable for installation in non-fire resistant mediums such as a wooden deck is marked **"SUITABLE FOR GROUND-MOUNTED RECESSED."**

LUMINAIRE INSTALLATION MARKINGS

All recessed luminaires except those marked **"FOR USE IN POURED CONCRETE ONLY"** are marked **"BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."**

Luminaires that produce temperatures in excess of 90C at points of mounting to the building structure are marked **"INSTALL IN BUILDINGS OF FIRE RESISTANT CONSTRUCTION."**

Only those luminaires with an integral junction box or wiring compartment marked in combination with the Listing Mark, **"MAXIMUM OF NO. ___ AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ C PERMITTED IN BOX,"** have been evaluated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked "ACCESS ABOVE CEILING REQUIRED" or "ACCESS BEHIND WALL REQUIRED."

Luminaires that are provided with polymeric recessed housings are marked "FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY" and "FOR USE IN NON-FIRE RATED INSTALLATIONS."

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

(1) For luminaire housing and trims, the housing is marked "USE WITH (manufacturer's name) (catalog number) TRIMS" and each trim is marked with the manufacturer's name and catalog number;

(2) For rough-in and finishing sections, the rough-in section is marked in combination with the Listing Mark, "ROUGH-IN SECTION FOR USE WITH FINISHING SECTION," where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Luminaire," and one of the following words adjacent to the Listing Mark: "Recessed Incandescent," "Recessed Incandescent Type IC," "Rough-In Section for Recessed Incandescent," "Rough-In Section for Recessed Incandescent Type IC" or "Finishing Section for Recessed Fixture."

Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

These products may be installed in either IC or Non-IC applications. The same rough-in section or luminaire housing is used for both IC and Non-IC applications. The choice of finishing section/trim and light source (lamp) determine whether the completed luminaire is suitable for Type IC installations or Non-IC installations.

Details for making the proper choice of finishing section/trim and lamp appropriate for the application are contained in the installation instructions packaged with the rough-in section/luminaire housing. All luminaires employ a thermal protective device to deactivate the lamp(s) in the event increased temperature conditions result where the installation instructions are not followed.

For additional information, see Incandescent Recessed Luminaires (IEZX), Incandescent Lamp Type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

TYPE IC INSTALLATIONS — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled "Type IC Luminaires."

TYPE NON-IC INSTALLATIONS — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled "Type Non-IC Luminaires."

LUMINAIRE INSTALLATION MARKINGS

The rough-in section or the luminaire housing of a convertible recessed luminaire is marked with the following two statements:

- A. "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING" and
- B. "DO NOT INSTALL INSULATION WITHIN 76 MM (3 IN.) OF ANY PART OF THE LUMINAIRE"

The marking in 'B' shall be on a peel-off label that is removed when the luminaire is installed in a Type IC installation.

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

(1) For luminaire housing and trims, the housing is marked "USE WITH (manufacturer's name) (catalog number) TRIMS," and each trim is marked with the manufacturer's name and catalog number;

(2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN ____ SECTION FOR CONVERTIBLE RECESSED LUMINAIRE" and a correlation marking for the trims "TYPE IC TRIMS/FINISHING SECTIONS: AA, BB, CC, etc." or "TYPE IC/NON-IC

TRIMS/FINISHING SECTIONS: AA, BB, CC, etc." The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION ____."

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Luminaire," and one of the following words adjacent to the Listing Mark: "Recessed Incandescent Convertible Non-IC/IC," "Recessed Incandescent Convertible Non-IC/IC Rough-In Section," or "Recessed Incandescent Convertible Non-IC/IC Finishing Section."

SPECIAL PURPOSE LUMINAIRES (IFAT)

This category covers special purpose luminaires.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

Canopy Luminaires (IFAW)

USE

This category covers luminaires for installation in cavities in outdoor canopies and marquees such as used over gas station pumping islands and similar locations in accordance with the National Electrical Code, Article 410.

These luminaires are not intended for indoor use or in outdoor installations where thermal insulation would be installed.

PRODUCT MARKING

Canopy luminaires are marked "CANOPY LUMINAIRE – NOT THERMALLY PROTECTED."

All luminaires are suitable for wet locations and may be subjected to water and precipitation from the back side unless marked "FOR COVERED CEILING MOUNT ONLY."

A recessed canopy luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires. A recessed canopy luminaire marked "OPEN CEILING MOUNT ONLY" is intended for an uncovered ceiling only.

RELATED PRODUCTS

Luminaires intended for recessed indoor use, or areas where thermal insulation could be installed, are covered under Fluorescent Recessed Luminaires (IEVV), High Intensity Discharge Recessed Luminaires (IEXZ) and Incandescent Recessed Luminaires (IEZX).

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Luminaire," and one of the following words adjacent to the Listing Mark: "Incandescent Canopy," "Fluorescent Canopy," "HID Canopy" or other appropriate product name.

Electric Discharge Lighting Systems, Cold Cathode (IFAY)

USE

This category covers lighting systems that incorporate electric discharge tubing with ferrule type end caps, commonly referred to as cold cathode lighting, which is electrically connected to the output of a transformer, power supply or ballast by ferrule type lampholders. Each transformer or power supply in the system is not rated more than 120 mA operating current (150 mA rated output current) when the open circuit voltage is over 7500 V, and not more than 240 mA operating current (300 mA rated output current) when the open circuit voltage is 7500 V or less. These systems are for installation in accordance with Article 410 of NFPA 70, "National Electrical Code" (NEC).

These lighting systems may incorporate transformers, power supplies or ballasts that have a marked output voltage greater than 1000 V. Such systems are not intended for use in dwellings in accordance with Article 410 of the NEC.

These lighting systems provide general illumination in accordance with Article 410 of the NEC.

INSTALLATION

Electric discharge lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction nor approval of the installation. The final acceptance of the field-installed lighting system is the responsibility of the Authority Having Jurisdiction.

PRODUCT MARKINGS

These lighting systems may incorporate ballasts that have marked output voltages 1000 V or less. Such systems are intended for use in dwellings and other premises when provided with circuit interrupting lamp-holders that de-energize the circuit during lamp replacement, unless they are marked "Not for Dwelling Use."

These systems are intended for permanent installation in indoor, dry locations unless marked in combination with the Listing Mark "Suitable for Damp Locations" or "Suitable for Wet Locations."

RELATED PRODUCTS

This category does not cover neon tubing for display windows, outline lighting or signs which are covered under Signs (UXYT).

This category does not cover field assembled neon systems in display windows, outline lighting, or skeletal neon signs which are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

This category does not cover field installed neon outline lighting systems that outline or call attention to architectural details of a room or building. Those products are covered under Field Installed Neon Outline Lighting Systems (UYAM).

Outline lighting of the incandescent, HID or fluorescent type fabricated in factory-built sections is covered under Signs (UXYT).

Lighting systems operating at 1000 V or less are covered under Fluorescent Luminaires (IEUZ), HID Luminaires (IEXT) and Incandescent Luminaires (IEZR).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 48, "Electric Signs."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on each transformer and transformer enclosure, and the containers in which the remaining lighting system parts are packaged, or on the remaining lighting system parts themselves, referencing a specific field-installed System Number, is the only method provided by UL to identify these lighting systems covered under its Listing and Follow-Up Services. The Listing Mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," an issue number, "Field-Installed Electric Discharge Lighting System Part," and the words "The Listing of this lighting system is contingent upon installation according to the specifications of (Listee's Name), System No. _____ and the National Electrical Code."

Fluorescent Recessed Fixtures, Classified For Fire Resistance (IFCX)

These fixtures are fluorescent lamp types for recessed installation in ceilings in accordance with the provisions of the National Electrical Code. They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

These fixtures have been investigated and found to comply with applicable electrical requirements and are so labeled.

Classified for Fire Resistance**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classified and Follow-Up Service.

UNDERWRITERS LABORATORIES INC. ®
CLASSIFIED
FLUORESCENT RECESSED FIXTURES
FIRE RESISTANCE CLASSIFICATION
DESIGN NOS. — — — — —
SEE UL FIRE RESISTANCE DIRECTORY

Landscape Lighting Systems, Low Voltage (IFDH)**USE**

This category covers low voltage landscape lighting systems and individual components. A system consists of a power unit, a number of lighting units, connectors and the interconnecting cable for the low voltage circuit. The individual components include Listed power units, lighting units and all other items needed to install a complete system in accordance with product ratings, instructions and markings.

Recessed lighting units intended for installation in a building wall or similar application, are provided with a means to connect conduit and may be installed such that insulation (and other combustible materials) are in contact with the lighting unit.

The Listed components from the same company or from different companies may be used to form a complete system as long as the components are used in accordance with the product ratings, markings and instructions.

The wire used to connect the Power Unit to the individual lighting units and fittings shall be Listed SPT-3, Underground Low Energy Circuit Cable, or other wire suitable for direct burial, wet locations and sun resistant as specified in the installation instructions provided with the power unit or lighting units.

RATINGS

The maximum output of each secondary circuit is 15 V, ac, 25 amps and 300 VA. The output of the power unit is intended to be connected to not more than the specified number and rating of lighting units. The maximum number of lighting units is determined by adding the wattages of the individual lighting units. The total resultant wattage should not exceed the secondary wattage of the power unit. The power unit outputs are not to be connected in series or parallel.

PRODUCT MARKING

Power units marked "Indoor Use Only" are for use only in indoor applications and are provided with a means for connections of the lighting units to the secondary circuit by a wiring system in accordance with Chapter 3 of the National Electrical Code. Power units marked "Outdoor Use Only" are for use only in outdoor applications and are provided with a secondary connection means specified in the standard. Power units marked "Indoor/Outdoor Use" are for use in indoor or outdoor applications and are provided with a means for connection of the lighting units to the secondary circuit by a wiring system in accordance with Chapter 3 of the NEC.

The power unit, if located outdoors, is intended to be connected to a receptacle outlet with a cover assembly marked suitable for wet locations while in use. The lighting units are intended for certain indoor applications, such as atriums or shopping malls and outdoor wet location installations.

For a power unit that is marked "For Use with Submersible Fixtures or Submersible Pumps," the transformer complies with Section 680-5(a) of the NEC. These power units may be used to energize low voltage submersible fixtures and pumps identified for use in decorative fountains or ponds not intended for swimming or wading, in accordance with the National Electrical Code, Article 680, Part E.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1838, "Low Voltage Landscape Lighting Systems."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the word "Landscape" followed by the product name "Power Unit," "Lighting Unit," "Fitting," or other appropriate product name as shown in the individual Listings.

Luminaires Classified for Fire Resistance (IFDL)

This category covers luminaires for recessed installation in ceilings in accordance with the provisions of the National Electrical Code. They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

These luminaires have been investigated and found to comply with applicable electrical requirements and are so labeled.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

UNDERWRITERS LABORATORIES INC.®
LUMINAIRES CLASSIFIED FOR FIRE RESISTANCE
DESIGN NOS.

SEE UL FIRE RESISTANCE DIRECTORY

or
UNDERWRITERS LABORATORIES INC.®
LUMINAIRES CLASSIFIED FOR FIRE RESISTANCE
SEE PRODUCT CATEGORY
IN UL FIRE RESISTANCE DIRECTORY

Low Voltage Luminaires for Recreational Vehicle Use (IFDQ)

USE

This category covers incandescent and fluorescent lamp type luminaires rated 24 V or less, ac or dc, intended for use in recreational vehicles, supplied by a transformer, battery, converter or similar power supply source and installed in accordance with the National Electrical Code.

PRODUCT MARKING

These luminaires are intended for use in dry locations only, unless marked "Suitable for Wet Locations."

These luminaires have been investigated for ceiling mounting as surface or recessed types. Luminaires for either ceiling or wall mounting are marked "Ceiling/Wall Mount." Luminaires limited to wall mounting are marked "Wall Mount Only," unless so constructed that they are obviously intended for wall mounting.

These luminaires are marked with the minimum temperature rating for supply conductors, except when integral lead wire is provided for connection to the supply conductors. The integral leads are of sufficient length for field splices to be located behind the ceiling or wall panel. After field splices are completed, it is intended the splices be positioned in a space not affected by the luminaire lamp heat.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 234, "Low Voltage Lighting Fixtures for Use in Recreational Vehicles."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and the product name "Low Voltage RV Luminaire" or other appropriate product name as shown in the individual Listing.

Low Voltage Incandescent Luminaires and Fittings (IFDR)

USE

This category covers low voltage fixtures and fixture fittings that are parts and/or subassemblies intended for final assembly into low voltage fixtures in the field.

These fixtures and fittings are rated 30 V or less, for connection to an isolating type power supply Listed for the purpose and installed using fixed wiring methods in accordance with Article 411 of the National Electrical Code. Sets of low voltage fixtures may include the power supply and interconnecting cabling.

This category includes low voltage fixture systems incorporating fixtures which may be repositionable along supply conductors that also support the fixture. The power supply is provided with integral protection that de-energizes the output upon overloading or inadvertent shorting of live parts of the system that may be uninsulated and exposed.

PRODUCT MARKING

Fixtures and fittings restricted for connection to a Class 2 power limited source of supply are identified by product markings or installation instructions, and either provided with a Class 2 power source or correlation markings.

These fixtures and fittings are intended for surface mounting, suspended or recessed installation and are marked for either dry, damp, or wet locations. A fixture or fitting marked for damp or wet locations is rated 15 V maximum unless live parts are made inaccessible to contact during normal use. See Luminaires and Fittings (HYXT) for additional installation marking.

Recessed fixtures marked "Type IC" or "Inherently Protected" may be installed in accordance with the NEC Section 410-66 such that insulation and other combustible materials are in contact with and over the top of the fixture.

All recessed fixtures not marked "Type IC" or "Inherently Protected" are intended to be installed such that insulation is not placed over the top or

within 3 inches of the sides of the fixture, and other combustible materials are spaced, except at the points of support, at least 1/2 inch from the fixtures.

INSTALLATION INSTRUCTIONS

Fixtures intended for recessed or undershelf installation into a cabinet are provided with installation instructions depicting the intended use.

RELATED PRODUCTS

Low Voltage Landscape Lighting Systems consisting of a remote power supply source, flexible cord interconnecting means and relocatable outdoor use lighting assemblies are covered under the category of that title (IFDH).

Fixtures incorporating an integral transformer or power supply with a low voltage secondary are covered under Incandescent Surface Mounted Luminaires (IEZR).

Low voltage fixtures intended for connection only to 24 V or less source of supply in recreational vehicles are covered under Low Voltage Luminaires for Recreational Vehicle Use (IFDQ).

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Services. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Low Voltage Fixture," "Low Voltage Recessed Fixture," "Low Voltage Cabinet Fixture," "Low Voltage Fixture Power Supply," "Low Voltage Fixture System," "Low Voltage Fixture Fitting" or other appropriate product name as shown in the individual Listings.

Medical-dental Luminaires (IFDT)

USE

This category covers task lighting products such as examination room lights, illuminated eye charts and the like, which are intended for installation and use in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, but not in patient vicinity. Patient vicinity is defined as areas in which patients are normally cared for, and it is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient. Patient vicinity includes a space within the room 6 feet (1.83 m) beyond the perimeter of the bed (examination table, dental chair, treatment booth, and the like) in its intended location, and extending vertically 7-1/2 feet (2.29 m) above the floor.

These lighting products have been investigated from the standpoint of electrical, fire, and casualty hazards only. Lighting products that have been evaluated as patient care equipment, with respect to the isolation and leakage current requirements of UL 544, "Medical and Dental Equipment," appear under Medical and Dental Equipment, Professional (KFBQ) in the Electrical Appliance and Utilization Equipment Directory. Other hazards, including those which may result from use of this equipment in the presence of flammable anesthetics, have not been investigated. The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Medical Examining Room Light," "Eye Chart" or the name of the specific type of product as shown in the individual Listing.

Stage and Studio Luminaires and Connector Strips (IFDZ)

USE

This category covers stage and studio luminaires (lighting fixtures) and connector strips rated 600 V or less, for use in theaters, studios and similar locations in accordance with Articles 520 and 530 of the National Electrical Code. Stage and studio luminaires and connector strips are not intended for residential use.

LUMINAIRE INSTALLATION MARKINGS

Stage and studio luminaires and connector strips are not intended for residential use and are marked "Not For Residential Use."

Some stage luminaires are marked with a lamp replacement marking stating "CAUTION — Risk of Fire — Use With Max ____ Watt Lamp" where the space is filled in with a number specifying the maximum wattage.

RELATED PRODUCTS

For additional information, see Special Purpose Luminaires (IFAT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1573, "Stage and Studio Lighting Units."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Stage Lighting Unit," "Stage Luminaire," "Stage Border Lighting Unit," "Stage Border Luminaire," "Connector Strip" or other appropriate product name.

Submersible Luminaires (IFEV)**USE**

This category covers submersible luminaires intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70, in fountains and similar water-containing vessels not intended to accommodate the complete or partial immersion of persons. For Listings of luminaires intended for use in swimming pools, spas, hot tubs and other vessels intended to accommodate persons, see Swimming Pool and Spa Equipment, Lighting Fixtures, and Fixture Housings (WBDT).

This category also covers submersible junction boxes intended for use with submersible luminaires and other submersible fountain equipment.

Luminaires that have been investigated for operation only while submerged in water are marked "Submerge Before Lighting," or with equivalent wording, and such marking is visible after installation of the luminaire.

Submersible luminaires have been evaluated for both outdoor and indoor use.

Dry-Niche Submersible Luminaire — These luminaires are intended for permanent installation only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are designed for servicing from the rear in a passageway behind the fountain wall or, if mounted in the bottom of the fountain, in a tunnel underneath the fountain. For purposes of installation, maintenance or servicing, the luminaire may consist of two separable parts. One part includes a factory-installed length of flexible cord terminating in an attachment plug, and the second part includes a receptacle for the attachment plug and a splice compartment in which the branch circuit conductors are connected.

Wet-Niche Submersible Luminaire — These luminaires are intended to be installed only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are intended for installation in a permanently installed luminaire housing (forming shell) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the proper housings with which they are to be used, and the luminaire housings are marked to indicate the luminaires with which the housings are to be used. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft. The flexible cord is confined in the luminaire housing by the luminaire and permits the luminaire to be removed from the luminaire housing and to be lifted to the fountain deck for servicing without lowering the water level or disconnecting the luminaire from the branch circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 12 ft long cord will not permit luminaire removal from the luminaire housing and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the luminaire housing.

No-Niche Submersible Luminaire — These luminaires are intended to be installed only on the walls of a fountain unless accompanying installation instructions describe the additional option of installation on the bottom of the fountain. These luminaires are mounted to a bracket permanently secured in or on the wall or bottom with the luminaire completely surrounded by water. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft that is confined by the luminaire and fountain wall or bottom. The flexible cord permits the luminaire to be removed from the mounting bracket and to be lifted to the fountain deck for servicing without lower-

ing the water level or disconnecting the luminaire from the branch circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 12 ft long cord will not permit luminaire removal from the mounting bracket and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored between the luminaire and fountain wall.

Special Use Submersible Luminaire — These luminaires are intended to rest directly on the fountain floor or may be otherwise located in the fountain. The luminaires are provided with a permanently attached exposed flexible cord intended to be routed into a submersible junction box, or the luminaires have other means for permanent connection to the supply circuit.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 676, "Underwater Lighting Fixtures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Mounting Bracket for No-Niche Luminaire," "Housing for Wet-Niche Luminaire," "Wet-Niche Submersible Luminaire," "Dry Niche Submersible Luminaire," "No-Niche Submersible Luminaire," "Special Use Submersible Luminaire," "Submersible Junction Box" or other appropriate product name. Alternatively, the luminaires may be designated "Submersible Luminaire, (Wet-) (Dry-) (No-) Niche Type," as appropriate.

Track Lights and Tracks (IFFR)**USE**

This category covers track lighting systems for installation on or recessed into ceilings and walls and intended to be connected to a source of supply by a fixed wiring method only in accordance with the National Electrical Code, Article 410, Part R.

These track lighting systems are intended for installation in dry locations only.

Track lighting systems consist of the following parts, each bearing a Listing Mark: 1) track sections, 2) connectors to connect track sections together and/or track sections to the supply, 3) end caps that insert into the last track sections in a run, 4) lighting assemblies, 5) electrical accessory parts such as low voltage adaptors and 6) accessory parts such as mounting hardware, track section hooks and fixture assembly light deflectors.

The following components are not part of the Listed track lighting system and are not acceptable for use with a Listed track lighting system: 1) receptacle adaptors that when inserted into a track section will accommodate attachment plug-connected products and 2) power supply cord connectors that when inserted into the end of a track section enables the track system to serve as a power supply cord connected to its source of supply.

INSTALLATION INSTRUCTIONS

Each smallest unit package or carton is provided with installation instructions that contain a) a product description, b) a statement to identify the track system, c) description of the part or parts intended to be used with and d) instructions describing how the part or parts are to be installed to the track system.

Each track section is provided with installation instructions that identify the track system series number or model name and model or catalog number of the track. The installation instructions also specify the electrical ratings of the track system and identify the intended type of mounting (pendant or surface) and distance between mounting clips, screws and stems.

Additional instructions and limitations of use for track lighting systems are specified in the Important Safety Instructions provided with each track section.

Those track systems with track sections that may be cut to length in the field by the installer are provided with installation instructions that indicate the proper method of cutting.

Those track systems intended to have the mounting holes in each track section drilled by the installer are provided with a drill guide in the center of each track section and include in the accompanying installation instructions the proper location of the mounting holes.

INSTALLATION MARKING

Track systems that are designed only for use with mounting clips are identified by marking on each track section "For Clip Mounting Only."

Track systems that are intended only for nonpendant mounting are identified by marking each track section "Do not pendant mount this track such as by stems or wires."

Track systems that are intended for recessed installation are marked "Suitable for Use in Poured Concrete," or "For use in ____" if

intended to be an integral part of a suspended ceiling grid. The blank space is filled in with the manufacturer's name and catalog number or product description of the structural building system with which the track system is to be used.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1574, "Track Lighting Systems."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Track Lighting Fitting."

The complete four-element Listing Mark will appear on the smallest unit container in which the product is packaged when the product is of such a size that only the UL logo can be applied to the product.

LUMINAIRE FITTINGS (IFFX)

GENERAL

This category covers luminaire fittings which are incomplete parts and/or subassemblies of luminaires intended for final assembly into luminaires in the field. Completely assembled luminaires incorporating luminaire fittings may be submitted to the Laboratories as part of the Factory Inspection and Follow-Up Service Program for Fluorescent, Incandescent and High Intensity Discharge Luminaires and, if found suitable, Listed as luminaires. Smoothness and thickness of wireways, methods for connection to a recognized wiring system, suitability of splice enclosure and means for inspecting splices are typical considerations given to the completed luminaire which cannot be judged until the fittings are assembled into a complete luminaire.

A complete luminaire assembled from Listed luminaire fittings will bear the luminaire Listing Mark appropriate to the luminaire category if produced under UL's Factory Inspection and Follow-Up Service Program. The determination of the acceptability of an assembly not so labeled rests with the local Authority Having Jurisdiction.

PRODUCT MARKINGS

All fittings are marked in combination with the UL Listing Mark indicating the location where they can be used:

A fitting marked "DRY LOCATIONS ONLY" is intended to be installed in indoor dry locations.

A fitting marked "SUITABLE FOR DAMP LOCATIONS" is intended to be installed in a damp or dry location.

A fitting marked "SUITABLE FOR WET LOCATIONS" is intended to be installed in a wet, damp or dry location.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) and in NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Certain devices in the categories of Sign Accessories (UYMR), Surface Metal Raceways (RJBT), Surface Nonmetallic Raceways (RJTX), Surface Metal Raceway Fittings (RJPR) and Surface Nonmetallic Raceway Fittings (RJYT) are also suitable for use with luminaire fittings.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires," and standards applicable to the device(s) constituting the fitting.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Luminaire Fitting," "Swivel Joint," "Disconnect Fitting" or other appropriate product name as shown in the individual Listings.

Fixture Fittings for Track Lighting (IFGT)

USE

This category covers fixture fittings that are parts and/or subassemblies intended for field installation in specific track lighting systems, identified by catalog number and company name. They include track lighting fixture units intended for installation in specific existing field-installed tracks of another manufacturer in accordance with the fixture unit manufacturer's instructions.

These fittings have been investigated to determine that, when installed and used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete track lighting system.

For additional information, see Luminaire Fittings (IFFX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1574, "Track Lighting Systems."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by UL to identify products under its Classification and Follow-Up Service.

FIXTURE FITTING FOR TRACK LIGHTING
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE ONLY WITH TRACK LIGHTING MODEL _____

MANUFACTURED BY _____

RECESSED LUMINAIRE TRIMS (IFGW)

USE

This category covers trims intended for field installation in specified recessed incandescent luminaires. These products have been evaluated by UL to determine that, when used in accordance with the manufacturer's instructions, they comply with the appropriate requirements for the complete luminaire.

This category covers trims for use with newly installed luminaires and as retrofit devices intended to be used to replace existing trims. The specified luminaires with which the trims have been evaluated are identified in the Classification Marking on the trim.

PRODUCT MARKING

Each trim is marked with its catalog number and manufacturer. Each trim is also marked with the Lamp Replacement Markings, and may include the blinking light warning marking.

RELATED PRODUCTS

Reflector retrofit kits used to add or replace reflectors in fluorescent luminaires are covered under Luminaire Conversions, Retrofit (IEUQ). Retrofit devices used to convert incandescent exit fixtures to fluorescent exit fixtures are covered under Exit Sign Conversion Kits (FWCF), and Exit Sign Retrofit Kits (GGET).

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate retrofit luminaire trim conversions is UL 1598, "Luminaires."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "RECESSED LUMINAIRE TRIM FOR USE WITH (identification of which trims are to be used) ONLY," and a control number.

FLAT CONDUCTOR CABLE, TYPE FCC (IKKT)

GENERAL

This category covers flat conductor cable, Type FCC, which is an assembly of three or more solid, flat, parallel, insulated copper conductors. The cable is intended for installation in accordance with Article 324 of NFPA 70, "National Electrical Code." The cable is marked for use with specific fittings [see Flat Conductor Cable Fittings (IKMW)] to make up a particular flat conductor cable, Type FCC, wiring system.

The cable is marked on both sides with the manufacturer's identification, wire size in AWG, Type FCC, 300 V, temperature rating and ampacity. Type FCC cable always has one conductor identified as the grounding conductor and one conductor identified as the grounded conductor. The identification means shall be printing or striping the conductor green (grounding) or white (grounded).

Installation instructions are supplied by the manufacturer for use by the general contractor, erector, electrical contractor, electrical inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flat Conductor Cable, Type FCC."

FLAT CONDUCTOR CABLE FITTINGS (IKMW)

Flat conductor cable fittings include all those items needed to install Flat Conductor Cable, Type FCC (see Guide IKKT) in accordance with Article 328 of the National Electrical Code. This category includes top and bottom shields, connectors, transition assemblies and insulators.

A fitting is suitable for use with a specific Type FCC cable in a particular Flat Conductor Cable Wiring System and is so identified.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, electrical inspector and others concerned with the installation.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flat Conductor Cable Fittings".

FLEXIBLE METALLIC TUBING (ILJW)

GENERAL

This category covers flexible metallic tubing in trade sizes 3/8, 1/2 and 3/4 for installation in accordance with Article 349 of NFPA 70, "National Electrical Code."

Flexible metallic tubing is intended for installation where not subject to physical damage such as above suspended ceilings.

Flexible metallic tubing is permitted to be used in lengths of six feet or less, in dry locations, in accessible locations when protected from physical damage or concealed, to contain branch circuit conductors at a maximum potential of 1000 V and when terminated in suitable fittings.

Flexible metallic tubing shall not be used underground for direct earth burial or in duct which is buried, or embedded in poured concrete or aggregate or in direct contact with the earth or where subjected to corrosive conditions or in direct contact with masonry or in damp locations. Flexible metallic tubing, containing circuit conductors protected by overcurrent devices rated 20 A or less, is suitable as a grounding means.

RELATED PRODUCTS

See Fittings, Flexible Metallic Tubing (ILNR) with respect to fittings suitable as a grounding means.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Metallic Tubing."

FLEXIBLE METALLIC TUBING ASSEMBLIES (ILLT)

Flexible metallic tubing assemblies consist of a length of flexible metallic tubing terminated at each end with a permanently attached connector. They include trade sizes 3/8, 1/2 and 3/4 in. for installation in accordance with Article 349 of the National Electrical Code.

Flexible metallic tubing assemblies, in the 3/4 in. and smaller trade sizes and not more than 6 ft in length and when the circuits therein are protected by overcurrent devices rated 20A or less are considered suitable as a grounding means.

The basic standards used to investigate products in this category are UL 360, Liquidtight Flexible Steel Conduit, Electrical and UL 514, Outlet Boxes and Fittings, Electrical.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Metallic Tubing Assembly".

FITTINGS, FLEXIBLE METALLIC TUBING (ILNR)

GENERAL

This category covers flexible metallic tubing fittings from 3/8 to 3/4 in. incl. trade sizes.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance

with NFPA 70, "National Electrical Code." The conduit used with the connectors must contain conductors protected by overcurrent devices rated 20 A or less.

PRODUCT MARKINGS

Fittings have been tested for use only with steel tubing unless marked on the device or carton to indicate suitability for use with aluminum or other material.

ADDITIONAL INFORMATION

For additional information, see Flexible Metallic Tubing (ILJW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Flexible Metallic Tubing Fitting," "Connector," "Coupling" or other appropriate product name as shown in the individual Listings.

FLEXIBLE STAGE AND LIGHTING POWER CABLE (ILPH)

USE AND INSTALLATION

This category covers flexible stage and lighting power cable constructed and Listed for use in accordance with Article 400 of NFPA 70, "National Electrical Code" (NEC). Flexible stage and lighting cable consists of either a single insulated conductor or two or more insulated conductors, with or without fully insulated equipment grounding conductors, with an overall jacket.

The cable is intended to supply power to stage equipment in theaters and studios in indoor and outdoor locations as described in Articles 520 and 530 of the NEC. The cable is rated 600 V, 60°C, 75°C, 90°C or 105°C. The cable is intended for use at ampacities in accordance with Table 400.5(B) of the NEC. Cable rated 105°C has the same ampacities assigned to 90°C rated cable in Table 400.5(B) and is so marked.

Flexible stage and lighting power cable employs flexible stranded copper conductors in a size range of 8 AWG to 250 kcmil and is designated as Type SC (thermoset insulation and jacket), Type SCT (thermoplastic insulation and jacket) and Type SCE (thermoplastic elastomer insulation and jacket).

PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to mineral oil at 60°C. Cable marked "Oil Resistant 75C" is suitable for exposure to mineral oil at 75°C.

Cable marked "water resistant" is suitable for immersion in water.

Cable marked "-40C" complies with a bend test (not a suppleness test) at -40°C. Cable marked "-50C" complies with a bend test (not a suppleness test) at -50°C.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Stage and Lighting Power Cable."

FUEL CELL EQUIPMENT (IRGN)

USE AND INSTALLATION

This category covers fuel cell type power plants with input/output rated 600 V or less and intended for installation in accordance with NFPA 70, "National Electrical Code." These products are marked for indoor or outdoor use. Authorities Having Jurisdiction should be consulted regarding the use of this equipment before installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

STATIONARY FUEL CELL POWER PLANTS (IRGX)

USE AND INSTALLATION

This category covers products intended for use in accordance with NFPA 70, "National Electrical Code." These products have an input/output rating of 600 V or less, and are for use as marked with either natural gas or propane. These products are intended for permanent connection to the source of supply and for installation in accordance with the manufacturer's installation instructions. Products rated more than 50 kW are intended for installation in accordance with NFPA 853, "Installation of Stationary Fuel Cell Power Plants."

PRODUCT MARKINGS

These products are marked to indicate the manufacturer's name, model number, serial number, type of gaseous fuel required and required delivery pressure, fuel gas consumption at rated electrical output, input/output electrical ratings, average A-rated sound level at the rating distance, and rated ambient temperature range.

RELATED PRODUCTS

This category does not cover any factory or field-installed integral or interconnected equipment provided, such as an inverter, to change the fuel cell stack output voltage or frequency, or to serve as a utility interactive connection means. Products associated with this equipment for these purposes are covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH).

ADDITIONAL INFORMATION

For additional information, see Fuel Cell Equipment (IRGN) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI Z21.83, "Stationary Fuel Cell Power Plants."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Stationary Fuel Cell Power Plant," "IN ACCORDANCE WITH ANSI Z21.83-(+) - (++)", and a control number.

(+) - Suffix letter of latest addendum, if applicable.

(++) - Issue year of latest addendum or standard.

FUEL GAS BOOSTER COMPRESSOR EQUIPMENT (IUXX)

GENERAL

This category covers fuel gas booster compressor equipment designed to increase the pipe line pressure of a fuel gas, such as natural gas, from a low fuel gas pressure (nominally 1/4 to 5 psig) to a higher outlet pressure (such as 30 to 115 psig). This higher-pressure fuel gas is then supplied to an external product, such as a microturbine. The equipment is intended for either indoor or outdoor use.

The equipment consists of a motor compressor or an open type compressor, internal gas piping, wiring and a combination of associated electrical and mechanical assemblies and controls on a common frame in an overall enclosure.

Equipment containing a motor compressor connected to a flammable fuel gas piping system has been investigated to determine that flame will not propagate beyond the inlet and outlet fuel gas connections of the equipment, should an electrical fault occur within the motor compressor when a flammable gas/air mixture is present.

INSTALLATION

These units are intended to be installed in accordance with the requirements of NFPA 70, "National Electrical Code."

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60335-2-34, "Household and Similar Electrical Appliances, Part 2: Particular Requirements for Motor-Compressors" and UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuel Gas Booster" or "Fuel Gas Booster Compressor," as appropriate.

FUSED POWER CIRCUIT DEVICES (IYSR)

This category covers manually and electrically operated switching type devices accommodating Class L or Class T fuses and rated 601-6000 amps, 600 volts or less AC or DC.

This category also covers enclosures which are intended to house open type fused power circuit devices. These devices have been investigated for use at 100 per cent of their amp rating and are intended for use on circuits having available fault currents of 100,000, 150,000 or 200,000 rms symmetrical amps or 20,000, 50,000 or 100,000 amps DC as indicated on the device.

Fused Power Circuit Devices may be either bolted pressure contact switches or high pressure butt type contact switches. Bolted pressure contact switches have blade jaw type construction where all blade joints and subjected to high clamping pressure when the switch is closed by means of bolt, cam or similar mechanical action.

High-pressure butt type contact switches have butt type contacts and a spring charged mechanism.

Some Fused Power Circuit Devices are described as being without enclosures (open type). This means that such devices are for use only as parts of listed equipment.

Fused Power Circuit Devices which are suitable for use as service switches are marked "Suitable For Use As Service Equipment."

Some fused power circuit devices incorporate neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only For Use As Service Equipment."

Fused power circuit devices marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Some Fused Power Circuit Devices may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Electrically tripped and/or operated Fused Power Circuit Devices which have been found suitable for ground fault protection are marked "Suitable For Ground Fault Protection When Combined With Class _____ (or Manufacturer and Cat. No.) Ground Fault Sensing Element" or the equivalent.

Devices for use with Class I ground fault sensing and relaying equipment include those which are capable of interrupting 12 times their rated current or which have integral means to prevent disconnecting at levels of fault current exceeding their contact interrupting capability.

Devices for use with Class II ground fault sensing and relaying equipment are capable of interrupting 10 times their rated current and are for use in ground fault protection systems where means to prevent disconnecting at levels of fault current exceeding their contact interrupting capability are incorporated within the ground fault sensing and relaying equipment.

Fused Power Circuit Devices as listed herein are for use with copper conductors unless the device is marked to indicate that terminals are also suitable for aluminum conductors.

The basic standard used to investigate products in this category is UL977, "Fused Power-Circuit Devices".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Fused Power Circuit Device"; "Enclosed Fused Power-Circuit Device"; "Enclosed Fused Power-Circuit Device Suitable for Use as Service Equipment" or "Fused Power-Circuit Device Enclosure".

On Fused Power Circuit Devices with integral enclosures the Listing Mark is applied to the enclosure. On devices for use in other enclosures (open type) the Listing Mark is applied to the switching unit.

FUSEHOLDERS (IYXV)

FUSEHOLDERS, CARTRIDGE FUSE (IZLT)

This listing covers fuse holders for Class CC, G, H, J, K, R and T cartridge fuses.

Reference should be made to the classification of Snap Switches — Combination Fuse holder for combination of cartridge fuse holders and snap switches.

Class CTL cartridge fuse holders may be identified by the words "Class CTL" or "CTL" on the fuse holder as part of the marking.

Class CTL cartridge fuse holders have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more fuse holder poles than the number for which the assembly is designed and rated.

Fuse holders for Class CC, J, R and T fuses have been investigated for use on circuits having available fault currents of 25,000, 50,000, 100,000, or 200,000 RMS symmetrical amps as marked on the fuse holder. A fuse holder marked for use on such circuits does not qualify the equipment in which it is installed for use on circuits with higher available currents than

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may be indicated by equipment markings. For information regarding the use of fuses with interrupting ratings in equipment refer to the general information, Cartridge Nonrenewable Fuses.

The basic standard used to investigate products in this category is UL512, "Fuse holders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Fuse holder", "Cartridge Fuse holder".

FUSEHOLDERS, SPECIAL PURPOSE (IZND) USE AND INSTALLATION

This category covers fuseholders intended for use with Listed special purpose fuses.

These fuseholders are designed for special purpose applications. They incorporate dimensional or other rejection features to prevent the installation of other Listed classes of renewable and nonrenewable cartridge fuses.

PRODUCT MARKINGS

Special purpose fuseholders are marked with their voltage and current rating. When the fuseholders are investigated for use in circuits capable of delivering in excess of 10,000 RMS symmetrical amps, fuseholders are marked with their withstand rating. When not so marked, the withstand rating is 10,000 A. A fuseholder marked for use in circuits capable of delivering in excess of 10,000 RMS symmetrical amps does not qualify the equipment in which it is installed for use in circuits with higher available currents than may be indicated by the equipment markings.

Fuseholders in this category are designed for use with specific fuses, and are marked with the manufacturer and catalog number of the fuse it is intended to accommodate.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 512, "Fuseholders."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Special Purpose Fuseholder."

FITTINGS FOR FUSEHOLDERS (IZZR)

This Listing covers: Fuse Reducers designed for use in cartridge fuse holders to permit the insertion of fuses of smaller rating. Type S Fuse Adapters designed for use in Edison base fuse holders to permit the insertion of Type S fuses. Special adapters designed to permit use of miscellaneous plug fuses in Edison base fuse holders to provide supplementary overcurrent protection.

Fuse reducers are primarily intended for use with open fuse holders. The use of fuse reducers in enclosed switches, panelboards, or other enclosures may introduce a hazard due to reduced spacings. Consideration should therefore be given spacings when fuse holders are used within enclosures.

The basic standard used to investigate products in this category is UL512, "Fuse holders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Fuse holder Fitting", "Fuse Reducer", "Fuse Adapter", or other appropriate product name.

PLUG FUSE, FUSEHOLDERS (JAMZ) GENERAL

This category covers fuseholders for Edison base and Type S fuses. Some of these fuseholders are intended for use in panelboards and may include separately Listed snap switches.

Fuseholders may be provided on a cover plate for mounting to outlet boxes. These fuseholders are provided with grounding means so that the plate can be grounded when installed on nonmetallic outlet boxes.

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Class CTL plug fuseholders may be identified by the words "Class CTL" or "CTL" on the fuseholder as part of the marking.

Class CTL plug fuseholders have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more fuseholder poles than the number for which the assembly is designed and rated.

RELATED PRODUCTS

Fuseholders that are an integral part of a snap switch are covered under Snap Switches (WJQR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 512, "Fuseholders."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Fuse holder" or "Plug Fuse holder" or other appropriate product name as shown in the individual Listings.

FUSES (JCQR)

CARTRIDGE FUSES, NONRENEWABLE (JDDZ)

This category covers cartridge enclosed fuses of the nonrenewable type, rated 0-600 A, 250 V, 0-1200 A, 300 V, 0-6000 A, 600 V. These fuses are intended for use on ac circuits only unless also marked with a dc voltage rating. These fuses are suitable for branch circuit, feeder and service overcurrent protection in accordance with the requirements of the National Electrical Code, NFPA 70.

Fuses designated as Class K1, K5, K9 (0-600 A, 250 V, ac, or 600 V, ac) are classified as to interrupting capacity and in terms of maximum clearing amp squared seconds and maximum peak let-through current. They incorporate dimensional features equivalent to, and are interchangeable with Class H Fuses. They are not marked "Current Limiting."

Fuses designated as Class RK1 and RK5 (0-600 A, 250 V, ac or 600 V, ac) are high interrupting capacity types and are marked "Current Limiting." They are classified in terms of maximum clearing amp squared seconds and maximum peak let-through current at 50, 100 and 200 thousand rms symmetrical amps. They incorporate features which permit their insertion into Class H and K fuseholders. Also, they are provided with a feature that allows their insertion into rejection type fuseholders designed to accept only Class RK1 or RK5 fuses.

Fuses designated as Class CC (0-30 A, 600 V, ac) are high interrupting capacity types and are marked "Current Limiting."

Fuses designated as Class CD (31-60 A, 600 V, ac) are high interrupting capacity types and are marked "Current Limiting."

Fuses designated as Class G (0-60 A, 480 V, ac) are high interrupting capacity types and are marked "Current Limiting."

Fuses designated as Class J (0-600 A, 600 V, ac) or Class L (601-6000 A, 600 V, ac) are high interrupting capacity types and are marked "Current Limiting."

Fuses designated as Class T (0-1200 A, 300 V and 0-800 A, 600 V, ac) are high interrupting capacity types and are marked "Current Limiting."

The term "Current Limiting" indicates that a fuse, when tested on a circuit capable of delivering a specific short circuit current (rms amps symmetrical) at rated voltage, will start to melt within 90 electrical degrees and will clear the circuit within 180 electrical degrees (1/2 cycle).

Because the time required for a fuse to melt is dependent on the available current of the circuit, a fuse that may be "Current Limiting" when subjected to a specific short circuit current (rms amps symmetrical) may not be current limiting on a circuit of lower maximum available current.

The following tables indicate the maximum permissible let-through values that are obtained when the fuse is connected to a circuit having an available current tabulated below.

MAXIMUM PEAK LET-THROUGH CURRENT (I_p amperes) AND CLEARING

I²t (ampere squared seconds)

Class CC Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	I _p ×10 ³ 3	I ² t×10 ³ 2	I _p ×10 ³ 3	I ² t×10 ³ 2	I _p ×10 ³ 4	I ² t×10 ³ 3
0-15						

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Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
16-20	3	2	4	3	5	3
21-30	6	7	7.5	7	12	7

Class CD Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
31-60	8	30	10	30	16	30

Class G Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
0-1			1		0.8	
2-3			1.5		1.2	
4-6			2		1.8	
7-10			3		2.8	
11-15			4		3.8	
16-20			5		5	
21-25			6		6	
26-30			7		7	
31-35			8		14	
36-40			8.5		17	
41-45			9		18.5	
46-50			9.5		21	
51-60			10.5		25	

Class J and 600 Volt Class T Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
0-30	6	7	7.5	7	12	7
31-60	8	30	10	30	16	30
61-100	12	60	14	80	20	80
101-200	16	200	20	300	30	300
201-400	25	1000	30	1100	45	1100
401-600	35	2500	45	2500	70	2500
601-800	50	4000	55	4000	75	4000

300 V Class T Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
0-30	5	3.5	7	3.5	9	3.5
31-60	7	15	9	15	12	15
61-100	9	40	12	40	15	40
101-200	13	150	16	150	20	150
201-400	22	550	28	550	35	550
401-600	29	1000	37	1000	46	1000
601-800	37	1500	50	1500	65	1500
801-1200	50	3500	65	3500	80	4000

Class K1 Fuses — Identical to let-through limits for Class RK1 (shown below).

Class K5 Fuses — Identical to let-through limits for Class RK5 (shown below).

Class K9 Fuses.

Rating Amps	50kA Through 200kA	
	Ipx10 ³	I ² tx10 ³
0-30	14	50
31-60	28	250
61-100	35	650
101-200	60	3500
201-400	80	15000
401-600	130	40000

Class L Fuses

Rating Amps	50kA or Threshold Current Whichever Is Greater		100kA		200kA	
	Ipx10 ³	I ² tx10 ⁶	Ipx10 ³	I ² tx10 ⁶	Ipx10 ³	I ² tx10 ⁶
601-800	80	10	80	10	80	10
801-1200	80	12	80	12	120	15
1201-1600	100	22	100	22	150	30
1601-2000	110	35	120	35	165	40
2001-2500	—	—	165	75	180	75
2501-3000	—	—	175	100	200	100
3001-4000	—	—	220	150	250	150

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Rating Amps	50kA or Threshold Current Whichever Is Greater		100kA		200kA	
	Ipx10 ³	I ² tx10 ⁶	Ipx10 ³	I ² tx10 ⁶	Ipx10 ³	I ² tx10 ⁶
4001-5000	—	—	—	350	300	350
5001-6000	—	—	—	350	350	500

Cartridge Nonrenewable**Class RK1 Fuses**

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
0-30	6	10	10	10	12	11
31-60	10	40	12	40	16	50
61-100	14	100	16	100	20	100
101-200	18	400	22	400	30	400
201-400	33	1200	35	1200	50	1600
401-600	43	3000	50	3000	70	4000

Class RK5 Fuses

Rating Amps	Between Threshold & 50kA		100kA		200kA	
	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³	Ipx10 ³	I ² tx10 ³
0-30	11	50	11	50	14	50
31-60	20	200	21	200	26	200
61-100	22	500	25	500	32	500
101-200	32	1600	40	1600	50	2000
201-400	50	5200	60	5200	75	6000
401-600	65	10000	80	10000	100	12000

Class K-1, K-5 and K-9 fuses are marked, in addition to their regular voltage and current ratings, with an interrupting rating of 200,000, 100,000 or 50,000 A (rms symmetrical).

Class CC, CD, RK1, RK5, J, L and T fuses are marked, in addition to their regular voltage and current ratings, with an interrupting rating of 200,000 A (rms symmetrical).

Class G fuses are marked, in addition to their regular voltage and current ratings, with an interrupting rating of 100,000 A (rms symmetrical).

Class H fuses have an interrupting rating of 10,000 A (rms symmetrical).

When a fuse has a dc rating, it is marked with the dc voltage and interrupting rating.

A Class CC, CD, G, J, K or R fuse and a Class T fuse rated 600 A or less may have an interrupting rating of 10,000, 20,000, 50,000 or 100,000 A, dc. A Class T fuse rated 601 – 1200 A and a Class L fuse may have an interrupting rating of 20,000, 50,000 or 100,000 A, dc. A Class H fuse may have an interrupting rating of 10,000 A, dc.

Class K and R fuses that have been investigated for use in protecting trailing cables in dc circuits in mines are marked “Mine Duty” and have an interrupting rating of 20,000 A, dc.

Equipment (a switch, motor starter, panelboard, etc.) that has been investigated and found suitable for use with these fuses is marked with the class of fuse intended to be used in the equipment, and available current rating applicable to that piece of equipment. The equipment, with these fuses installed, is suitable for use on circuits having a maximum available fault current up to the short circuit rating of the equipment, or the interrupting rating of the fuse, whichever is lower.

An interrupting rating on a fuse included in a piece of equipment does not automatically qualify the equipment in which the fuses are installed for use on circuits with higher available currents than the rating of the equipment itself.

Classes CC, CD, G, H, J, K, L, R and T fuses may be marked with the designation “Time Delay” indicating that they have a time delay characteristic. This is the only designation which indicates that the fuse has been evaluated in accordance with the time delay requirements of the Standard.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 198M, “Mine-Duty Fuses,” UL 248-1, “Low-Voltage Fuses – General Requirements,” UL 248-4, “Class CC Fuses,” UL 248-5, “Class G Fuses,” UL 248-6, “Class H Nonrenewable Fuses,” UL 248-8, “Class J Fuses,” UL 248-9, “Class K Fuses,” UL 248-10, “Class L Fuses,” UL 248-12, “Class R Fuses,” UL 248-15, “Class T Fuses” and Subject 2126, “Outline of Investigation for Class CD Fuses,” dated June 25, 1997.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse.”

CARTRIDGE FUSES, RENEWABLE (JDRX)

This listing covers cartridge enclosed fuses of the renewable type, 0-600 amp, 250 v; 0-600 amp, 600 v. These fuses are recognized as being suitable for branch circuit and service overcurrent protection in accordance with the requirements of the National Electrical Code.

Renewable fuses of a given voltage rating or current rating range are not interchangeable in the same fuse holder with fuses of a different voltage rating or current rating range.

Each line of renewable links has been investigated only with the same line of fuses from the same manufacturer.

These fuses may be marked with the designation "Time Delay" indicating that they have a time delay characteristic. This is the only designation which indicates that the fuse has been evaluated in accordance with the time delay requirements of the Standard.

The basic standards used to investigate products in this category are UL248-1, "Low-Voltage Fuses — General Requirements", and UL248-7, "Class H Renewable Fuses".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fuse" or "Fuse Renewal". The Listing Mark for fuses is marked on the product; the Listing Mark for fuse renewals is marked on each carton containing fuse renewals, with or without the UL symbol on the renewal.

FUSE ACCESSORIES (JDVS)

GENERAL — This listing covers signal indicating alarm actuating devices of the nonrenewable type and fuse covers which are suitable for use with Listed fuses as particularly indicated. The combination is used for branch circuit and service overcurrent protection in accordance with the requirements of the National Electrical Code.

SIGNAL INDICATING -ALARM ACTUATING DEVICES — These devices are intended to provide actuation of remote Listed or Recognized signaling devices, or provide a visual indication that a fuse has opened. Their operation is concurrent with that of the fuse, and after operation there is no electrical continuity between the line and load sides of the fuse accessory.

The accessories are not intended to be used as branch circuit and service overcurrent protection or supplementary overcurrent protection.

The devices are marked either on the device or on a label shipped with the devices, to indicate the minimum fuse size, and the maximum interrupting and voltage rating of the fuse with which the devices may be used.

FUSE COVERS — These devices are intended to be used with Listed branch circuit fuses. They may be nonindicating, or may be provided with an electrical or electromechanical indicator that operates when a fuse has opened. The fuse covers are intended to provide additional protection against incidental contact with live parts of the fuse holder assembly. The covers are not intended to be used in lieu of spacings in the equipment in which they are used.

Fuse covers may be designed so that they snap-fit onto the fuse body when the fuse is already installed, or they may be designed such that the fuse is installed in the cover before being inserted into the fuse holder. When the fuse cover is of the latter design, it is not intended to be used to remove a fuse under load, and it is marked "DO NOT OPERATE UNDER LOAD" or equivalent.

Fuse covers are marked either on the device or on the smallest unit carton with the class of fuse, fuse amperage rating and the voltage rating of the fuse with which they are intended to be used.

The basic standards used to investigate products in this category are UL248-1, "Low Voltage Fuses - General Requirements", UL248-4, "Class CC Fuses", UL248-5, "Class G Fuses", UL248-6, "Class H Nonrenewable Fuses", UL248-7, "Class H Renewable Fuses", UL248-8, "Class J Fuses", UL248-9, "Class K Fuses", UL248-10, "Class L Fuses", UL248-11, "Plug Fuses", UL248-12, "Class R Fuses", UL248-14, "Supplemental Fuses", UL248-15, "Class T Fuses", UL512, "Fuse holders".

The Listing Mark of Underwriters Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Fuse Accessory".

FUSES, MISCELLANEOUS, MINIATURE AND MICRO (JDYX)**USE**

This category covers supplemental fuses, which are also described as miscellaneous, miniature, and micro fuses. These fuses provide supplemental protection in appliances or utilization equipment to provide indi-

vidual protection for components or internal circuits. They are not suitable for branch circuit use. Specific physical dimensions are not specified, but dimensional limitations apply to prevent insertion of supplementary protection fuses into branch circuit fuse holders intended to accommodate branch circuit fuses of the Class CC, H, J, K, L, R, or T Type.

RATINGS

The voltage rating of supplemental fuses is 125 V ac or greater. Supplemental fuses (except for micro fuses) rated 250 V may have short circuit ratings at 250 V as shown in the table below, but have a minimum 10,000 A short circuit rating at 125 V. All other supplemental fuses (except for micro fuses) have a minimum short circuit rating of 10,000 A at their rated voltage, with an optional short circuit rating of 50,000 or 100,000 A.

Fuse Rating (Amps)	Short Circuit Rating (Amps)
1 or less	35
More than 1 to 3.5	100
More than 3.5 to 10	200
More than 10 to 15	750
More than 15 to 30	1500

PRODUCT MARKINGS

Short circuit ratings are marked on supplemental fuses or on the smallest packaging container.

Micro fuses are supplemental fuses with no principal dimension exceeding 10 mm (excluding leads). They are rated 125 V ac or greater, with a 50 A minimum short circuit rating.

Supplemental fuses may have a time delay characteristic. This information may be marked on the fuse or on the smallest packaging container.

Fuses covered under this category are not marked "Current Limiting."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 248-1, "Low Voltage Fuses - General Requirements" and UL 248-14, "Supplemental Fuses."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Supplemental Fuse," "Miscellaneous Fuse," "Miniature Fuse" or "Micro-Fuse."

FUSES, MISCELLANEOUS, MINIATURE AND MICRO, CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (JECR)

This category covers fuses investigated in accordance with IEC Publication 127, Cartridge Fuse-Links for Miniature Fuses, Second Edition 1974, and IEC Publication 127-3, Miniature Fuses, Part 3: Subminiature Fuse-Links, First Edition 1984. These devices are used for the protection of electric appliances, electronic equipment and component parts thereof, normally intended to be used indoors. These devices are not intended for appliances to be used under special conditions, such as in a corrosive or explosive atmosphere. These devices are not intended for branch circuit use. Dimensional limitations apply to prevent insertion of these devices into branch circuit fuseholders intended to accommodate branch circuit fuses of the Class CC, H, J, K, L, R or T type.

In accordance with the IEC Publications, these devices are categorized by pre-arcing time current characteristics as "quick acting" or "time lag" types. Additionally, these devices are categorized by rated breaking capacity as "low breaking capacity" or "high breaking capacity" types.

The IEC Publications contain "Standard Sheets" which give details of device dimensions, ampere and voltage ratings, pre-arcing time current characteristics and rated breaking capacity.

This publication is applicable to devices having nominal overall dimensions of 5mm by 20mm and 6.3mm by 32mm.

For the 5mm by 20mm size, the current rating is 6.3A maximum and the voltage rating is 250V. This size device may be of the "quick acting" or "time lag" type. The pre-arcing time current characteristic is marked on the device in the form of a symbol "F" for "quick acting" and "T" for "time lag". Both "T" and "F" types of 5mm by 20mm devices may be either "low breaking capacity" or "high breaking capacity" types. The "low breaking capacity" types are constructed with transparent bodies and have a rated breaking capacity at 250V of 35A or 10 times the rated current, whichever is greater. The "high breaking capacity" types are constructed of non-transparent bodies and have a rated breaking capacity at 250V of 1500A.

For the 6.3mm by 32mm size, the current rating is 10A maximum. The voltage rating is 250V for rated currents up to 2A. Above 2A and up to 4A, the voltage rating is 150V. Above 4A and up to 10A, the voltage rating is 60V. The 6.3mm by 32mm size devices are categorized as "quick acting" type only and are marked with the symbol "F". This size is also categorized as "low breaking capacity" type only, are constructed with transparent bodies, and have a rated breaking capacity at rated voltage of 35A or 10 times the rated current, whichever is greater.

This publication is applicable to devices having no principle body dimension exceeding 10mm, and includes both "top hat" and "pico" types. In addition to the applications noted above, these devices are primarily intended for use on printed wiring boards. These devices are categorized as "quick acting" or "time lag" types and are marked with the symbol "F" or "T" as appropriate. These devices are categorized as "low breaking capacity" only.

These devices have current ratings up to 5A maximum, voltage ratings of up to 250V maximum, and rated breaking capacities at rated voltage of up to 50A.

Marking

These devices are marked with the manufacturer's name or trademark, the symbol "F" or "T" as appropriate, the rated current and the rated voltage. The smallest package or unit container for these devices is marked with the same information, and in addition, is marked with a reference to the IEC Publication and the appropriate Standard Sheet of the IEC Publication to which the devices have been evaluated.

The Classification Marking of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size and shape permits is the only method provided by UL to identify these products manufactured under its Classification and Follow-Up Service.

The Classification Marking for these products includes the name Underwriters Laboratories Inc., and the statement "Classified by Underwriters Laboratories Inc., as to Compliance with IEC Publication _____

Only." Additionally, the Classification Marking may include the symbol UL in a circle in conjunction with the word "Classified."

FUSES, OVER 600 VOLTS (JEEG)

This listing covers power and distribution fuses with voltage ratings above 600 V.

GENERAL

The basic standards used to evaluate all fuses over 600V are ANSI/IEEE C37.40-1993, IEEE Standard Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-pole Air Switches, Fuse Disconnecting Switches, and Accessories, and ANSI/IEEE C37.41-1994, Design Tests for High-voltage Fuses, Distribution Enclosed Single-pole Air Switches, Fuse Disconnecting Switches, and Accessories.

Fuses over 600V are intended to be applied as specified in ANSI/IEEE C37.48-1987, IEEE Guide for Application, Operation, and Maintenance of High-voltage Fuses, Distribution Enclosed Single-pole Air Switches, Fuse Disconnecting Switches, and Accessories.

These fuses are intended to provide overcurrent protection in accordance with the requirements of the National Electrical Code. They are intended for installation in specific metal-enclosed switchgear.

These fuses are not intended to be interchanged with other manufacturer's fuses nor with other classes of Listed Fuses. Each fuse shall only be replaced with a fuse of the same manufacturer, type, and ratings. The melting-times at overcurrents are shown by each manufacturer's published time-current curves, which may vary between manufacturers, and fuse types or models.

Where used, the term "current limiting" indicates a relationship between the cutoff (peak let-through) current to prospective available current, within the current limiting range of the fuse, in accordance with characteristic curves published by the manufacturer. When operated within its current limiting range, a current limiting fuse introduces a high resistance to reduce current magnitude and duration, resulting in subsequent current interruption.

Power fuses are intended mainly for use in or near the generating source or substation, on three phase circuits. Distribution fuses are intended mainly for use in the distribution network, further downstream from the source or substation, on single-phase or three-phase circuits.

Back-up fuses are not intended to interrupt currents below their minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level. General Purpose fuses are not intended to interrupt currents below the current which causes melting of the fuse in not less than 1h. This current is their rated low current, which may be referred to as their rated minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level. Full Range fuses are intended to interrupt any current between the minimum current that can cause melting of its elements (at the highest ambient specified by the manufacturer), and its maximum interrupting rating.

Specific fuses covered are as follows:

E-RATED FUSES — E-rated power fuses, current-limiting type, in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. E-rated fuses may have either full range or general purpose characteristics, as designated in the individual Listings.

Each fuse is marked with the manufacturer's name or trademark, manufacturer's type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and "E" following the continuous current rating.

E-Rated fuses have the following melting-time characteristics:

Fuse rating 100A and below:

300 seconds within the range of 200-percent to 240 percent of the continuous current rating.

Fuse rating above 100A:

600 seconds within the range of 220-percent to 264-percent of the continuous current rating.

The melting-times at higher overcurrents are shown by each manufacturer's published time-current curves, which may vary between manufacturers and fuse types, or models.

In addition to the Standards specified above in GENERAL, the basic standard used to evaluate E-Rated Fuses is ANSI/IEEE C37.46-1988, Specifications for Power Fuses and Fuse Disconnecting Switches.

GENERAL PURPOSE FUSES — General Purpose current limiting power fuses, in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. General Purpose fuses have general purpose characteristics only.

Each fuse is marked with the manufacturer's name or trademark, manufacturer's type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and rated low current.

In addition to the other Standards specified above in GENERAL, the basic Standard used to evaluate General Purpose Current-Limiting Power Fuses is ANSI/IEEE C37.46-1988, Specifications for Power Fuses and Fuse Disconnecting Switches.

FUSE LINKS — Type K and Type T distribution fuse links, for voltages up to 38 kV, intended for use on ac circuits only.

Each fuse is marked with the manufacturer's name or trademark and rated continuous current followed by the type identification (eg. 40K). Other ratings are provided in the smallest shipping container, including the manufacturer's name or trademark, the manufacturer's type or identification number, and the rated continuous current followed by the type identification.

In addition to the Standards specified above in GENERAL, the basic standard used to evaluate Fuse Links is ANSI/IEEE C37.42-1989, Distribution Cutouts and Fuse Links - Specifications.

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the appropriate product name as shown in the individual Listings. The Listing Mark is marked on the fuse for E-Rated and General Purpose fuses; the Listing Mark is marked on each package for Fuse Links, with or without the UL symbol on the Fuse Link.

LOW-VOLTAGE FUSES CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (JEFA)

USE

This category covers fuses incorporating enclosed current-limiting fuse-links intended for protecting power-frequency ac circuits or dc circuits. These fuses are intended for use by authorized persons as referenced in IEC 60269-2-1, and are intended mainly for industrial applications.

PRODUCT TYPES

Fuses covered in this category are defined by size and operating characteristics.

The available sizes are 000, 00, 0, 1, 2, 3, 4, and 4a.

Fuses covered in this category are also defined by their utilization category as follows:

"gG" - indicates fuse-links with a full-range breaking capacity for general applications

"gM" - indicates fuse-links with a full-range breaking capacity for the protection of motor circuits

"aM" - indicates fuse-links with a partial range breaking capacity for the protection of motor circuits

"gD" - indicates time delay fuse-links with a full-range breaking capacity

"gN" - indicates non-time-delay fuse-links with a full-range breaking capacity

RATINGS

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The standard values of rated ac voltages are 400 V, 500 V and 690 V. The rated dc voltages are 250 V and 440 V.

Fuses covered under this category have ampere ratings related to size as follows:

Fuse Size	Ampere Range
000	10 to 315
00	6 to 160
0	6 to 160
1	80 to 250
2	125 to 400
3	315 to 630
4	500 to 1000
4a	500 to 1250

PRODUCT MARKINGS

The following information is marked on all fuse-links where practicable: manufacturer's name or trademark, manufacturer's identification reference, size, rated voltage, rated current, breaking range, utilization category, kind of current, and rated frequency (if applicable).

When the size of the fuse-link makes it impracticable to include all markings on the fuse-link, the manufacturer's name or trademark, manufacturer's identification reference, size, rated voltage, and rated current will be marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is International Electrotechnical Commission 60269-2, "Low-voltage fuses, Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)" - Sections I to V: Examples of types of standardized fuses.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "Low-voltage Fuse," "IN ACCORDANCE WITH IEC 60269-2-1" and a control number.

PLUG FUSES (JEFV)

This listing covers Edison base and Type S plug fuses of the nonrenewable type rated 0-30 amp, 125 v.

Plug fuses designated as time-delay fuses are identified by the symbol "D", at least 1/8-in. in height, stamped, molded or printed in a location visible after installation of the fuse.

The interrupting rating of a plug fuse is 10,000 A ac only.

The basic standard used to investigate products in this category is UL198F, "Plug Fuses".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuse".

SPECIAL PURPOSE FUSES (JFHR)

This listing covers cartridge enclosed fuses of the nonrenewable type rated 0-6000 amps, 1000 volts maximum. These fuses are designed for special purpose applications such as in combination with low voltage power circuit breakers. Either they incorporate dimensional or other rejection features which make them non-interchangeable with Listed classes of renewable and nonrenewable cartridge fuses or they comply with all of the performance requirements applicable to Listed classes of renewable and nonrenewable cartridge fuses for which they may be substituted. Fuses which comply with all of the dimensional and performance requirements applicable to a Listed class of cartridge fuse may be marked "This fuse may substitute for a Listed Class _____ Fuse", where the appropriate fuse Class is placed in the blank.

This listing also covers special plug fuses of the nonrenewable type rated 0-6.25 amp, 125 v, ac for use in adaptors in Edison base fuse holders or in special fuse holders. They incorporate dimensional or other rejection features which make them non-interchangeable with Listed Edison base and Type S plug fuses. They combine standard overcurrent and short-circuit performance with features designed to afford protection to motors against overloads maintained for longer than predetermined times. They may be designated as time delay fuses and identified by the symbol "D", at least 1/8 in. in height, stamped, molded or printed in a location visible after installation of the fuse.

Special purpose fuses which have been investigated and found suitable are marked, in addition to their regular voltage and current ratings, with

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an interrupting rating of 100,000, 200,000 or 300,000 amps (rms symmetrical). When not so marked, the interrupting rating is 10,000 amps. If their performance is dependent upon the equipment with which they are designed to be used, they are also marked to indicate this fact.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuse".

UNIVERSAL MODULAR FUSES (JGFI)**USE**

This category covers universal modular fuses (UMF) which provide supplemental protection in appliances or utilization equipment to provide individual protection for components or internal circuits. They are not suitable for branch circuit use.

UMFs have opening characteristics which are different from supplemental fuses (JDYX). UMFs may or may not be suitable for substitution in applications where supplemental fuses are used.

CHARACTERISTICS AND RATINGS

UMFs are available with the following characteristics and ratings:

Mounting: Through-hole or surface mount.

Ampere Rating: 0.032A-6.3A

Operating Characteristics:

FF - Very quick acting

F - Quick acting

T - Time delay

TT - Long time-delay

Voltage Rating:

32 V ac (32 V dc optional)

63 V ac (63 V dc optional)

125 V ac (125 V dc optional)

250 V ac (250 V dc optional)

Interrupting Rating:

For 32 and 63 V rated fuses (Breaking Capacity)

For 125 V rated fuses

For 250 V rated fuses

the interrupting rating is 35 A or 10 times the fuse rating, whichever is greater
the interrupting rating is 50A or 10 times the fuse rating, whichever is greater
L - Low interrupting rating, 100 A
I - Intermediate interrupting rating, 500 A

H - High interrupting rating, 1500 A
the above ratings are marked on the UMF
the above ratings are marked on the UMF, or on the smallest unit container

For 250 V rated UMFs

For 32, 63 and 125 V rated UMFs

When the voltage rating is followed by "ac" the UMF is suitable for alternating current circuits only.

The above UMF is marked along with the ratings or as part of the Listing Mark.

REQUIREMENTS

The basic standards used to investigate products in this category are IEC 60127-1, "Miniature Fuses" and IEC 60127-4, "Universal Modular Fuse-links."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Universal Modular Fuse" or "UMF" or the UMF symbol.

GENERATORS (JZGZ)

This category covers generators, also referred to as generator heads. They are intended for installation in accordance with the National Electrical Code, NFPA 70.

PRODUCT MARKINGS/INSTALLATION INSTRUCTIONS

An enclosed type generator has the enclosure type designation marked on the generator for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The generator may also be marked "Rain-tight" or "Rainproof."

An enclosed type generator is not intended to be installed in an enclosure unless a marking on the generator, the installation instructions, or a stuffer sheet provided with the generator states that the generator may be enclosed. Specifications for the enclosure are included with the instructions or marking.

An open type generator is intended to be installed in an enclosure suitable for the end use. The minimum size of the enclosure is marked on the generator, provided in the installation instructions, or as a stuffer sheet provided with the generator.

A generator that has running heating and locked-rotor protection is marked "Thermally Protected."

Generators are marked for use in a 40°C (104°F) or higher ambient. All generators are provided with installation instruction information, which indicate the proper methods to secure the generator, electrically connect the generator to the prime mover, and connect it to the generator drive. The instructions also provide information concerning the load rating at which the generator can operate.

FIELD EVALUATED PROVISIONS

Suitability of guards for the shaft or other moving parts must be determined in the end-use application.

If a generator does not have thermal protection as described above, protection needs to be provided in the end-use application such as an overload relay. The generator has a marking indicating that the generator is not provided with thermal protection.

RELATED PRODUCTS

Electric generators for use in marine applications are covered under Alternators, Generators and Motors, Electric, Marine (ARDY) in the Marine Products Directory.

Electric generators for use in hazardous locations are covered under Generators for use in Hazardous Location (PSPT) in the Hazardous Locations Equipment Directory.

Electric generators used in combination with an engine for use with recreational vehicles are covered under Engine Generators (FTSR) in the Mechanical Equipment and Associated Products Directory.

Motor generator sets and frequency converters intended for use in ordinary locations are covered under Motor Generator Sets (PQYW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1004, "Electric Motors" and UL 2111, "Overheating Protection for Motors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Generator" or "Electric Generator Head."

GROUND-FAULT CIRCUIT INTERRUPTERS (KCXS)

This category covers ground-fault circuit interrupters for use in accordance with the National Electrical Code, NFPA 70.

A ground-fault circuit interrupter is a device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the circuit.

A ground-fault circuit interrupter is intended to be used only in a circuit where one of the conductors is solidly grounded.

A Class A ground-fault circuit interrupter trips when the current to ground has a value in the range of 4 through 6 milliamperes. A Class A ground-fault circuit interrupter is suitable for use in branch and feeder circuits, including swimming pool circuits. However, swimming pool circuits installed before local adoption of the 1965 National Electrical Code may include sufficient leakage current to cause a Class A ground-fault circuit interrupter to trip.

A Class B ground-fault circuit interrupter trips when the current to ground exceeds 20 mA. This product is suitable for use with underwater swimming pool lighting fixtures installed before the adoption of the 1965 National Electrical Code.

A ground-fault circuit interrupter of the enclosed type that has not been found suitable for use where it will be exposed to rain, is so marked.

The "TEST" and "RESET" buttons on the GFCIs are only intended to check for the proper functioning of the GFCI. They are not intended to be used as "ON/OFF" controls of motors or other loads unless the buttons are specifically marked "ON" and "OFF." Products with "ON" and "OFF" markings have been additionally Listed as "Miscellaneous Motor Controllers" and may be found under the (NMFT) category.

Some ground-fault circuit interrupters include receptacles, and are intended to be installed in an enclosure like a receptacle. Such receptacle types found to meet appropriate requirements are marked hospital grade and/or "CO/ALR." See "Receptacles for Attachment Plugs and Plugs" for further information.

This category also includes rebuilt or refurbished portable ground-fault circuit interrupters. These are factory rebuilt to the extent necessary to

replace components such as cords, plugs or cord connectors. Rebuilt ground-fault circuit interrupters are subject to the same requirements and Follow-Up Service as new ground-fault circuit interrupters.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 943, "Ground-fault Circuit Interrupters."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground-fault Circuit Interrupter," or the product name preceded by either the word "Rebuilt" or "Refurbished."

SPECIAL PURPOSE GROUND-FAULT CIRCUIT INTERRUPTERS (KCYC)

USE

This category covers ground-fault circuit interrupters for use in applications where equipment grounding is provided or is required by the National Electrical Code, NFPA 70, or where the voltage to ground is greater than 150 V.

PRODUCT CHARACTERISTICS

These ground-fault circuit interrupters trip when the current to ground has a value in the range of 15 through 20 mA. Let-go protection is not provided by the ground-fault circuit interrupter; however, a person touching the protected equipment and earth would have a low-impedance equipment grounding path in parallel with the person's body.

These ground-fault circuit interrupters rely upon equipment grounding for let-go protection. The reliability of the grounding circuit may be demonstrated by a system that monitors the grounding path to the service and to the load, such that an unacceptable increase in the resistance of the grounding path will cause the circuit to be opened, or by some other method that demonstrates, by investigation, that the grounding circuit is reliable or that faults are unlikely because of the level of insulation that is provided (double insulation).

CLASSES

These ground-fault circuit interrupters are divided into classes based upon voltage rating and the quality of the grounding circuit. Some may be used in circuits where grounding is not provided to the load but double insulation is provided.

A Class C ground-fault circuit interrupter (GFCI) is intended to be used in circuits with voltage not exceeding 300 V AC to ground on any conductor. The Class C GFCI is intended to be used in circuits where reliable equipment grounding or double insulation is provided or is required by the National Electrical Code.

A Class D GFCI is intended to be used in circuits with one or more conductors over 300 V to ground, where specially sized reliable equipment grounding, to provide a low impedance path so that the voltage across the body during a fault does not exceed 150 V, is provided for the protected equipment in the system.

A Class E GFCI is intended to be used in circuits with one or more conductors over 300 V to ground but with conventional equipment grounding or double insulation provided for the protected equipment in the system. These GFCIs respond rapidly to open the circuit before the magnitude and duration for the current flowing through a person's body exceeds the limits for ventricular fibrillation.

RELATED PRODUCTS

For additional information, see Ground-Fault Circuit Interrupters (KCXS) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 943, "Ground-Fault Circuit Interrupters" as modified by the "Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the name "Class ___ Ground-Fault Circuit Interrupter, Special Purpose."

GROUND-FAULT SENSING AND RELAYING EQUIPMENT (KDAX)

This category covers ground fault current sensing devices, relaying equipment, or combinations of ground fault current sensing devices and

relaying equipment, rated 600 volts maximum, which will operate to cause a disconnecting means to function at predetermined values of ground fault current in accordance with the National Electrical Code, ANSI/NFPA 70.

This equipment is intended to provide ground-fault protection of equipment at services and feeders.

This equipment is intended to operate devices with shunt trip coils such as fused power circuit devices, molded case circuit breakers, molded case switches and the like which constitute the disconnecting means. It is necessary that ground fault sensing and relaying equipment be coordinated with a disconnecting device to prevent the disconnecting device from interrupting a fault current that exceeds the interrupting capability of the disconnecting means.

To aid the user in making the proper selection of disconnecting means and sensing and relaying equipment, the sensing and relaying devices are designated as Class I or Class II.

Class I ground fault sensing and relaying equipment does not incorporate means to prevent opening of a disconnecting device at any level of fault current. This Class is suitable for use with a disconnecting device that is capable of interrupting the maximum available fault current of the system on which it is used. Examples of such disconnecting devices are (1) circuit breakers or fused circuit breakers used within their interrupting ratings, (2) fused switches having integral means to prevent the switch from opening at levels of fault current exceeding the interrupting capability of the switch and thus permitting the fuses to clear the circuit, (3) fused switches having an interrupting capability not less than 12 times their amp rating and which are capable of interrupting the levels of fault current that may exist before the fuses open.

Class II ground fault sensing and relaying equipment incorporates means to prevent initiation of opening of the disconnecting device if the fault current exceeds the contact interrupting capability of the disconnecting device with which it is intended to be used, such as in the case of a fused switch that does not have an interrupting capability of at least 12 times its amp rating.

Ground fault sensing and relaying equipment is marked to indicate the maximum inrush and sealed current ratings of the output circuit. These values should be compatible with the ratings of the tripping coils of the associated disconnecting devices.

Ground fault sensing and relaying equipment is marked to indicate the maximum available fault currents it is capable of withstanding without damage.

This listing covers enclosed equipment and also open type equipment which is intended for use in Listed equipment such as panelboards, switchboards, and the like where the acceptability of the combination has been determined by Underwriters Laboratories Inc.

The basic Standard used to investigate products in this category is UL1053, "Ground-Fault Sensing and Relaying Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Ground Fault Sensing and Relaying Equipment".

GROUNDING AND BONDING EQUIPMENT (KDER)

USE

This category covers bonding devices, ground clamps, grounding and bonding bushings and locknuts, ground rods, armored grounding wire, protector grounding wire, grounding wedges, ground clips for securing the ground wire to an outlet box, water meter shunts, and similar equipment.

Ground Rods — Ground rods and pipe electrodes are suitable for use as grounding electrodes in accordance with NFPA 70, "National Electrical Code" (NEC), and are also suitable for use in installation of lightning protection equipment.

Ground rods are marked with rod length, and manufacturer's name and catalog number within 12 in. of the top of the rod.

Ground rod couplings are intended for connection of two ground rods and are suitable for direct burial.

Ground Clamps — Strap type ground clamps are not suitable for attachment of the grounding conductor of an interior wiring system to a grounding electrode.

Ground clamps and other connectors suitable for use where buried in earth or embedded in concrete are marked for such use. The marking may be abbreviated "DB" (for "Direct Burial").

Listed ground clamps are also suitable for telecommunication applications such as telephone, radio, CATV, and the like in accordance with Articles 800, 810, 820 and Section 250.94 of the NEC, in addition to those covered under Grounding and Bonding Equipment, Communication (KDSH).

Listed irreversible compression type connectors are suitable for splicing the grounding electrode conductor.

Clamps are intended for use with rod and/or pipe electrodes in accordance with the NEC and are marked with the size of electrode and electrode grounding conductor with which the clamp is intended to be used. Clamps suitable for use on copper water tubing are marked for such use.

Grounding and Bonding Bushings — Bonding bushings for use with rigid metal conduit are provided with means (usually one or more set screws) for reliably bonding the bushing (and the conduit on which it is threaded) to the metal equipment enclosure or box. They provide the electrical continuity required by the NEC at service equipment and for circuits rated over 250 V. Means for connecting a grounding or bonding wire are not provided and if there is need for such a conductor a grounding bushing should be used.

Grounding bushings for use with conduit fittings, tubing (EMT) fittings, threaded rigid metal and intermediate metal conduit, or unthreaded rigid metal and intermediate metal conduit have provision for the connection of a bonding or grounding wire or have means for mounting a wire connector available from the manufacturer. Such a bushing may also have means (usually one or more set screws) for reliably bonding the bushing to the metal equipment enclosure or box in the same manner that this is accomplished by a bonding bushing. Grounding bushings provide the electrical continuity required by the NEC at service equipment and for circuits rated over 250 V. They may be used with or without a bonding or grounding conductor as determined by the bonding or grounding function that is intended to be accomplished.

Insulating throat liners in grounding or bonding bushings are suitable for temperatures of 150°C if they are black or brown in color. Unless otherwise marked, insulating throat liners of any other color are suitable for temperatures of 90°C.

Grounding and Bonding Locknuts — Grounding and bonding locknuts serve in a manner similar to grounding and bonding bushings except they do not provide abrasion protection for the conductor at the end of the conduit.

Ground Mesh — The ground mesh consists of a copper wire mesh that is intended to be installed in ground or embedded in concrete and bonded to the grounding electrode system for the purpose of improving ground planes, such as an equipotential plane as described in Sections 547.2 and 547.10 of the NEC. Ground mesh is not intended to serve as a required grounding electrode as described in Article 250 of the NEC.

Protector Grounding Wires — Protector grounding conductors are intended for use in accordance with Article 800 of the NEC. They are marked with the manufacturer's name, size, and "Protector Grounding Wire."

Special Tools — Grounding connectors to be assembled to wire using a special tool are to be assembled using the tool specified by the manufacturer on or in the connector shipping carton. Such tools are identified by appropriate marking.

PRODUCT MARKINGS

Some of the marking referred to above may be on a tag attached to the product.

RELATED PRODUCTS

Hospital grounding jacks and grounding cord assemblies are covered under Hospital Ground Jacks and Grounding Cord Assemblies (KEVX) under Health Care Facilities Equipment (KEVQ).

Grounding and bonding devices are for use only with copper conductors unless they are marked "AL" or "AL-CU."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 467, "Grounding and Bonding Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, on a tag securely attached to the product or container, or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Grounding Equipment," "Bonding Equipment," "Bonding Jumper," "Ground Clamp" or other appropriate product name as shown in the individual Listings.

GROUNDING AND BONDING EQUIPMENT, COMMUNICATION (KDSH)

USE

This category covers grounding devices for use in telecommunication applications such as telephone, radio, CATV, and the like in accordance with Articles 800, 810, 820 and Section 250-71(b) of the National Electrical Code.

Strap type ground clamps constructed of perforated or expanded metal are suitable for indoor use only. They are suitable for assembly on the marked pipe type and sizes using the marked tightening torque.

Ground clamps Listed under Grounding and Bonding Equipment (KDER) are also suitable for use in applications as specified in this category.

PRODUCT MARKINGS

Some of the required marking may be on a tag attached to the product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 467, "Grounding and Bonding Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, on a tag securely attached to the product or container, or on the product, when size or shape permits, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground Clamp - Communication."

GROUNDING EQUIPMENT, NEUTRAL GROUNDING DEVICES, OVER 600 V (KDZC)

This category covers neutral grounding devices for use on systems having AC voltage ratings from 601 volts to 38kV. Neutral grounding devices are used for the purpose of controlling the ground current or the potentials to ground of an alternating current system.

These devices are: grounding transformers, ground fault neutralizers, resistors, reactors, capacitors, or combination of these. In addition, these devices may include current sensors, relays, audible and visual signaling and similar accessories.

Devices that have been investigated for use outdoors are marked "Outdoor".

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended for use in areas accessible to qualified personnel only.

Devices covered under this category are marked with the following information: Name of manufacturer, serial number, name of device, type designation, impedance (except resistors), number of phases as applicable, rated current, rated frequency, rated time, rated voltage, BIL of line, indoor or outdoor service, weight, volume of oil (as applicable), instruction book number or equivalent.

The basic standards used to investigate products in this category are ANSI/IEEE Std. 32-1972, "IEEE Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices", and ANSI/IEEE C37.20.3-1987, "American National Standard Metal-Enclosed Interrupter Switchgear".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names or other appropriate product name: "Neutral Grounding Resistor", "Neutral Grounding Reactor".

HOISTWAY CABLE (MSZR)

GENERAL

This category covers hoistway cable which is a single and multiple conductor cable for use in raceways in accordance with Article 620 of NFPA

70, "National Electrical Code." Insulated conductors are 20 to 14 AWG inclusive. Multiple-conductor cable consists of insulated conductors cabled together with a suitable binder or sheath. The cable is rated 300 V or 600 V. The temperature rating, if so marked, is 90°C, otherwise it is 60°C. All cable complies with a vertical flame test.

PRODUCT MARKINGS

Hoistway cable is identified by the words "Hoistway Cable" printed on each insulated conductor and on the sheath, if provided.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 62, "Flexible Cord and Fixture Wire."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hoistway Cable."

INDUSTRIAL CONTROL EQUIPMENT (NIMX)

The listing covers the following products:

Industrial Control Panels
Motor Control Centers
Motor Controllers
Miscellaneous Apparatus
Programmable Controllers
Industrial Control Switches

Enclosed industrial control equipment identified with an enclosure type designation is intended for use as indicated in the guide information at the front of this directory (AALZ).

Industrial Control Equipment, is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Industrial Control Equipment, for which accessory kits are available for the field or distributor modification of the basic product or which may be assembled in many forms from separate components are marked to indicate the suitable accessories or separate components which may be used.

Control Panels

If the sealed rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

Overload relays or industrial control equipment incorporating overload relays are identified as to their maximum tripping time at 600 per cent of the overload relay current element trip rating. The designations "Class 10, Class 20, and Class 30" are used to identify the maximum tripping times, with the Class number indicating the maximum tripping time in seconds. Overload relays with maximum tripping times of 10 or 30 seconds are marked Class 10 or Class 30 respectively. Overload relays with a maximum tripping time of 20 seconds may be marked Class 20. Overload relays with tripping times in excess of 30 seconds are marked with their maximum tripping times. All unmarked overload relays have a maximum tripping time of 20 seconds.

There are open, across-the-line starters intended for bolt on mounting to panelboards and dead front switchboards and are so restricted by the Listing Mark. They are provided with a cover or door and the remaining portions of the enclosure are provided by the panel or switchboard enclosure.

Some industrial control equipment is suitable for use as service equipment and may be so marked. Such marking is part of the Listing Mark or is an integral part of other required markings.

Some of the equipment listed in this category has also been investigated for use aboard marine vessels over 65 ft. in length as covered by the Electrical Engineering Regulations of the United States Coast Guard, Subchapter J, CG-259, (46CFR Parts 110-113).

The Electrical Engineering Regulations of the United States Coast Guard classify marine type equipment as "Non-Watertight," "Drip-proof," or "Watertight."

Some industrial control equipment incorporates neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only For Use As Service Equipment."

Open type across-the-line starters designed only for use in panelboards or dead front switchboards employ Listing Marks with the product identity "INDUSTRIAL CONTROL EQUIPMENT FOR USE IN PANEL-BOARDS AND DEAD FRONT SWITCHBOARDS" or "IND. CONT. EQ. FOR USE IN PANELBOARDS AND DEAD FRONT SWITCHBOARDS."

For other than industrial control panels, and unless indicated otherwise in the general information for the following subcategories, enclosed type

product Listing Marks contain the product identity "INDUSTRIAL CONTROL EQUIPMENT" or the abbreviation "IND. CONT. EQ." on the enclosure, or the product identity "INDUSTRIAL CONTROL EQUIPMENT ENCLOSED" on the mechanism mounted within the enclosure. In either case, the Listing Mark indicates that the overall product with its enclosure is Listed.

Enclosures for use with open type products employ Listing Marks with the product identification "Enclosure For Industrial Control Equipment" or "Enclosure For Ind. Cont. Eq." and are marked to specify the Listed open type products to be installed within. Look for a Listing Mark on both the enclosure and the open mechanism.

For industrial control panels, one of the following product identities appears on the Listing Mark: "Open Industrial Control Panel", "Industrial Control Panel Enclosure", "Enclosed Industrial Control Panel".

The "Enclosed Industrial Control Panel" Listing Mark covers both the enclosure and the panel provided with it. Open panels employ the "Open Industrial Control Panel" Listing Mark. The "Industrial Control Panel Enclosure" Listing Mark covers only the enclosure; the compatibility of the enclosure and the installed equipment and associated wiring has not been investigated unless an "Enclosed Industrial Control Panel" Listing Mark is also present.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment" (or "Ind. Cont. Eq."); "Marine Industrial Control Equipment For Use Only On Vessels Over 65 Feet".

ELECTRO-SENSITIVE PROTECTIVE EQUIPMENT (NIOZ)

GENERAL

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery. ESPE is applied to machinery that presents a risk of personal injury. It provides protection by causing the machine to revert to a safe condition before a person can be placed in a hazardous situation. In addition to fire and electric shock hazards, these devices have been investigated for their safety-related performance features.

ESPE is designated as a certain "Type" as shown in the individual Listings and as defined in UL 61496-1, "Electro-Sensitive Protective Equipment Part 1: General Requirements and Tests." In addition, the individual Listings identify products that also have been investigated to UL 1998, "Software in Programmable Components."

This category does not specify the dimensions or configuration of the sensing zone and its disposition in relation to hazardous parts for any particular application, nor what constitutes a hazardous state of any machine. It is restricted to the functioning of the ESPE, the means by which it monitors the condition of the machine, and how it interfaces with the machine controls.

Products covered in this category may be relevant to applications other than those for the protection of persons, for example for the protection of machinery or products from mechanical damage. In those applications additional requirements may be necessary, for example when the materials that have to be recognized by the sensing function have different properties from those of persons.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

Active Opto-electronic Protective Devices (NIPF)

GENERAL

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices (AOPD) for the sensing function.

The sensing function is performed by opto-electronic emitting and receiving elements detecting the interruption of optical radiations generated, within the device, by an opaque object present in the specified detection zone.

Excluded from this category are AOPDs employing radiation at wavelengths outside the range 400 nm to 1,500 nm.

ADDITIONAL INFORMATION

For additional information, see Electro-sensitive Protective Equipment (NIOZ), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment," UL 61496-1, "Electro-Sensitive Protective Equipment Part 1: General Requirements and Tests" and UL

61496-2, "Electro-Sensitive Protective Equipment Part 2: Particular Requirements for Equipment Using Active Opto-Electronic Protective Devices (AOPDs)."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word "LISTED," a control number, and one of the following product names or abbreviations, as appropriate: "Electro-Sensitive Protective Equipment" or "ESPE," "Active Opto-Electronic Protective Device" or "AOPD," or other appropriate product name as shown in the individual Listings.

Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM)

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) for the sensing function.

The sensing function is performed by opto-electronic devices which respond to the diffused reflection from an opaque object present in the specified detection zone of their incident light.

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment," IEC 61496-1, "Safety of Machinery – Electro-Sensitive Protective Equipment - Part 1: General Requirements and Tests" and IEC 61496-3, "Safety of Machinery – Electrosensitive Protective Equipment - Part 3: Particular Requirements for Equipment Using Active Opto-Electronic Protective Devices Responsive to Diffuse Reflection."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names or abbreviations, as appropriate: "Electro-Sensitive Protective Equipment," "ESPE," or "Active Opto-Electronic Protective Device Responsive to Diffuse Reflection," "AOPDDR" or other appropriate product name as shown in the individual Listings.

ELEVATOR CONTROLS AND ACCESSORIES (NIQK)

This Listing covers accessories and controllers for use in elevator applications and it includes elevator accessories such as pushbuttons, indicator lights, lighting fixtures and elevator controls such as power supplies (motor and door operators).

Compliance of the equipment with the requirements of the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks, ANSI A17.1 has not been determined, however consideration has been given to the conditions of use for such equipment.

Some devices are open type (without enclosures). This means that such devices are for use as parts of Listed equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type devices are acceptable.

The basic standard used to investigate products in this category is UL 508 "Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Elevator Control", "Elevator Accessory".

EMERGENCY STOP DEVICES (NISD)

This Listing covers emergency stop devices including emergency stop units and emergency stop buttons. These devices are intended to be installed in a machine control system to perform a Category 0 or Category 1 stop function as defined in the Electrical Standard for Industrial Machinery, NFPA 79. The emergency stop actuator provided in these devices is either a momentary or self-latching type. These devices have been investigated for their functionality in addition to fire and electric shock safety.

The basic standards used to investigate products in this category are: UL 508, The Standard for Industrial Control Equipment
UL 991, The Standard for Tests for Safety-Related Controls Employing Solid-State Devices.

NFPA 79, Electrical Standard for Industrial Machinery

IEC 947-5-5, Electrical Emergency Stop with Mechanical Latching Function

EN 418, Safety of Machinery-Emergency Stop Equipment, Functional Aspects-Principles for Design

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction to this Directory) together with the word "LISTED", a control number and one of the following product names as appropriate: "Emergency Stop Device", "Emergency Stop Unit", "Emergency Stop Button", or other appropriate product names as shown in the individual Listing.

INDUSTRIAL CONTROL PANELS (NITW)

Industrial control panels are factory wired assemblies of industrial control equipment such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch circuit protective devices.

This category also covers enclosures which are intended to house open type industrial control panels or individual items of industrial control equipment as noted above.

The investigation of industrial control panels does not include investigation of the adequacy of the control and protective devices to supervise the functioning of the controlled equipment. Special relationships and evaluations may be necessary for the proper operation of certain equipment, such as air conditioning or refrigeration equipment. For Listings of such equipment incorporating Industrial Control Panels and where such evaluations have been made, see Air Conditioning Equipment (AAYZ) or Refrigeration Equipment (SCER) in the Electrical Appliance and Utilization Equipment Directory.

Industrial control panels designated for control of metal working machine tools and/or plastics machinery have been investigated to determine that they meet the requirements of the National Fire Protection Association Electrical Standard for Metal Working Machine Tools and plastics machinery NFPA 79, in addition to Article 670 of the National Electrical Code. Industrial control panels designated for control of metal working machine tools may not be suitable for use with equipment other than metal working machine tools.

Control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing, or braking operations and are additionally judged in accordance with the Occupational Safety and Health Administration Standard Section 1910.217 are Listed in the Automotive, Burglary Protection, and Mechanical Equipment Directory under the Press Controls and Systems Section, Guide QUEQ.

Control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations and evaluated as to fire and electrical shock hazard only are Classified as Power Press Control Panels, Guide NIXQ.

Control panels intended for industrial applications in the control of fossil fuel burning equipment such as incinerators, kilns, and drying ovens and evaluated as to electrical fire and shock hazard only are Classified as Flame Control Panels, Guide NIVT.

Control panels intended for industrial applications in the control of elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment and evaluated as to fire and electrical shock hazard only are Classified as Elevator Control Panels, Guide NIUU.

Controllers for Electric Fire Pumps are Listed in the Fire Protection Equipment Directory under the Pump Controller Section, Guide QYZS.

Control panels provided with intrinsically safe circuits for extension into a hazardous location are Listed in Section II of the Hazardous Locations Equipment Directory under Industrial Control Equipment, Industrial Control Panels Relating to Hazardous Location, Guide NRBX.

Control panels intended for access control systems which provide a means of regulating or controlling entry into an area are Listed in the Security Equipment Directory under the Access Control System Units Section, Guide ALVY.

The basic requirements used to investigate products in this category are contained in Subject 508A, "Outline of Investigation for Industrial Control Panels".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Open Industrial Control Panel", "Industrial Control Panel Enclosure", "Enclosed Industrial Control Panel", "Metalworking Machine Tool Control Panel", "Plastics Machinery Control Panel".

For additional information see the general information for Industrial Control Equipment (NIMX).

Elevator Control Panels (NIUU)

Elevator control panels covered by this category consist of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment.

The basic requirements used to investigate products in this category are contained in Subject 508A, "Outline of Investigation for Industrial Control Panels".

The control panels that have been investigated with respect to electrical shock and fire hazards only, are marked with Statement No. 1.

Equipment that has been investigated in accordance with the requirements of American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks, ANSI/ASME A17.1, and American National Standard Safety Code for Elevator and Escalator Electrical Equipment, ANSI/ASME A17.5, is marked with Statement No. 2.

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "CLASSIFIED", a control number, one of the following product names: "Open Elevator Control Panel" or "Enclosed Elevator Control Panel" and Statement No. 1 or No. 2 as applicable and as illustrated below:

(Product Name)
CLASSIFIED BY

UNDERWRITERS LABORATORIES INC.

Statement No. 1: "As to electrical, shock and fire hazard only. Classification does not include evaluation with respect to ANSI/ASME A17.1 or A17.5";

(Control No.)
or

Statement No. 2: "As to electrical, shock and fire hazard, and in accordance with ANSI/ASME A17.1 and A17.5".

Flame Control Panels (NIVT)

USE

This category covers flame control panels intended for application in the control of fossil fuel burning equipment such as incinerators, kilns and drying ovens. Flame control panels have been Classified only as to electrical fire and shock hazards incident to their use in ordinary locations. The compatibility of the panel with the controlled equipment from the standpoint of programming the burner(s) and preventing hazardous conditions due to firing of fuel has not been determined.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Panels (NITW), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 508A, "Outline of Investigation for Industrial Control Panels."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product name "Open Flame Control Panel" or "Enclosed Flame Control Panel," "AS TO ELECTRICAL SHOCK AND FIRE HAZARDS ONLY," and a control number.

Power Press Control Panels (NIXQ)

USE

This category covers power press control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations. Power press control panels have been Classified only as to fire and electric shock hazards incident to their use in ordinary locations.

Power press control panels have been investigated to determine that they meet the requirements of NFPA 79, "Electrical Standard for Metal Working Machine Tools," in addition to Article 670 of the National Electrical Code, NFPA 70.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Panels (NITW), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 508A, "Outline of Investigation for Industrial Control Panels."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above

the UL symbol (as illustrated in the Introduction of this Directory), the product name "Open Power Press Control Panel" or "Enclosed Power Press Control Panel," "AS TO ELECTRICAL SHOCK AND FIRE HAZARDS ONLY," and a control number.

MOTOR CONTROL CENTERS (NJAV)

Motor Control Centers are floor mounted assemblies of one or more enclosed vertical sections having a common horizontal power bus and primarily containing combination Motor Control Units. In addition, the Motor Control Centers may contain other units such as relay units, circuit breaker units, disconnect switch units, or panelboard units. Units are mounted one above the other in the vertical sections. Power may be supplied to the individual units by vertical power bus or, if the bus is omitted, by suitable wiring.

A combination Motor Control Unit includes an externally operable circuit disconnecting means, branch circuit overcurrent protection, and a Motor Controller.

For information concerning fuse or circuit breaker protection for running overcurrent protective device(s) of Motor Controllers, refer to the general information, Motor Controllers (NJOT).

Horizontal bus interconnecting abutting vertical sections are covered by the listing of the sections when the section Listing Marks indicate a series of sections.

Motor Control Center Sections and Units are rated 600 v, maximum.

A motor control center section is marked "Short-circuit current rating amps - RMS symmetrical volts - maximum. Do not install on circuits with available short-circuit currents greater than the lowest short-circuit rating of any installed unit" or the equivalent.

A motor control center unit is marked "Unit short-circuit current rating - RMS symmetrical amps - volts maximum, when equipped with fuse or circuit breaker" or equivalent.

The marking "Suitable for use as Service Equipment" appears on each Motor Control Center section optionally intended for use at a service.

Some sections incorporate neutrals factory bonded to the enclosure. Such sections are marked "Suitable only for use as Service Equipment."

A section marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

A section which has been investigated to determine that it is rainproof is marked "Rainproof." A motor control center rainproof enclosure has been investigated to determine that it is rainproof. The enclosure is intended to enclose one or more "motor control center sections."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Motor Control Center Unit," "Motor Control Center Section," or "Motor Control Center Rainproof Enclosure".

The basic standard used to investigate products in this category is UL845, "Electric Motor Control Centers".

The Listing Marks for Motor Control Center Sections also includes the marking "_____ OF _____". The first space shall be stamped with a number indicating the position that the section occupies in the series of sections constituting the Motor Control Center. The latter space shall be stamped with the total number of sections in the Motor Control Center. Only those sections that bear the Listing Mark are covered under the service of UL. The Listing Mark on the Motor Control Center Section does not cover the individual units which are installed in the section. Each unit is identified by its Listing Mark.

MOTOR CONTROLLERS OVER 1500 V (NJHU)

This listing covers enclosed motor controllers having AC voltage ratings in the range of 2.2 kV to 2.5 kV, 3.8 kV to 5.0 kV or 6.2 kV to 7.2 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

Equipment covered by this category has been investigated for use on three phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line to line open circuit voltage, and a phase factor of $1.73 \times 10^{-\text{sup}(6)}$.

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

These motor controllers may consist of a single vertical section housing one or more individual controllers or may consist of several abutting vertical sections intended for interconnection by means of a suitable horizontal bus. These vertical sections are normally free standing, however, a single motor controller may be provided in a construction intended for wall mounting.

The basic standard used to investigate products in this category is UL347, "High Voltage Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "High Voltage Industrial Control Equipment", or "High Voltage Motor Control Equipment Section".

The Listing Mark for High Voltage Motor Control Equipment Sections also includes the designation "_____ of _____". The first space is stamped with the number indicating the position that the section occupies in the series of sections constituting the High Voltage Motor Control Equipment. The latter space is stamped with the total number of sections in the High Voltage Motor Control Equipment (including sections not Bearing a UL Listing Mark).

Each Listed High Voltage Motor Control Equipment Section consists of one or more High Voltage Industrial Control Equipment Units. Each Listed High Voltage Industrial Control Equipment Unit is individually identified as a Listed product.

Power Conversion Equipment, Medium Voltage (NJIC)

This Listing covers enclosed power conversion equipment with primary voltage ratings of 1501-7200 volts. Equipment covered by this category supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or Transistor output modules, dynamic braking modules, and input/output accessory kits for medium voltage power conversion equipment. This equipment is intended for use in ordinary locations in accordance with the National Electrical Code.

Medium voltage power conversion equipment incorporating overload protection for motors are marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided.

Equipment not providing motor overload protection, is marked to indicate motor protection such as thermal overload relays or a thermally protected motor must be otherwise provided.

Medium voltage power conversion equipment is marked with the following electrical ratings:

Input Ratings: Voltage, maximum continuous input current, frequency, number of phases, maximum allowable system symmetrical short-circuit current, and impulse withstand.

Output Ratings: Maximum output voltage, rated continuous current, frequency range and number of phases.

The basic requirements used to investigate products in this category are found in SU347A, "Medium Voltage Power Conversion Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Medium Voltage Power Conversion Equipment."

MOTOR CONTROLLER ACCESSORIES OVER 1500 V (NJIJ)

This listing covers accessories for field installation in motor controllers having AC voltage ratings in the range of 2.2kV to 2.5kV, 3.8kV to 5.0kV or 6.2kV to 7.2kV. The motor controllers are intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

The basic standard used to investigate products in this category is UL347, "High Voltage Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "High Voltage Industrial Control Equipment Accessory".

MOTOR CONTROLLERS (NJOT)

This listing covers the following devices rated 600 v or less, and those rated 701-1500 v:

Auxiliary Devices
Combination Motor Controllers.
Float- and Pressure-Operated Motor Controllers
Magnetic Motor Controllers
Manual Motor Controllers
Miscellaneous Motor Controllers
Power Conversion Equipment

Some Motor Controllers are open type (without enclosures). This means that such devices are for use as parts of Listed equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type devices are acceptable.

This Listing also covers enclosures for housing open type devices. Such enclosures are marked to identify the open type devices which may be suitably installed therein.

Motor Controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c ratings and at ten times motor full load running current for d-c ratings.

Motor Controllers incorporating thermal cutouts, thermal overload relays or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by motor branch circuit, short circuit and ground fault protective devices selected in accordance with the National Electrical Code and any additional information marked on the product. Motor Controllers may specify that protection is to be provided by fuses or by an inverse time circuit breaker. If there is no marking on protective device type, controllers are considered suitably protected by either type of device. Motor Controllers may specify a maximum rating of protective device. If not marked with a rating, the controllers are considered suitably protected by a protective device of the maximum rating permitted by the National Electrical Code.

Unless otherwise marked, motor controllers incorporating thermal cutouts or overload relays are considered suitable for use on circuits having available fault currents not greater than:

Rating	Full Load Current	RMS Symmetrical
HP (600 V) Max)	Amps (701-1500v)	Amps
1 or less	—	1,000
1-1/2 to 50	0-50	5,000
51 to 200	51-200	10,000
201 to 400	201-400	18,000
401 to 600	401-600	30,000
601 to 900	601-850	42,000
901 to 1600	851-1500	85,000

Motor Controllers which are marked "Suitable For Use On A Circuit Capable Of Delivering Not More Than _____ RMS Symmetrical Amps, _____ Volts Maximum" have been investigated for the additional rating indicated.

Motor Controllers for group installations are marked with a maximum rating of fuse which is considered to suitably protect the controller for the group installation. Such fuse ratings may be in excess of the values given above.

Controllers for Electric Motor Drive Fire Pumps are listed in the Fire Protection Equipment List under the Pump Controller section.

Auxiliary Devices (NKCR)**GENERAL**

This category covers machine-operated switches, magnetically-operated control switches, miscellaneous manually-operated switches, push-button stations (including parts such as pilot lights and selector switches), thermal and magnetic overload relays, and time-delay relays.

These devices are for use in control circuits of magnetic motor controllers and the like. Such devices are marked with the voltage rating and whether they are intended for Standard of Heavy Duty, or with a code designation such as A600, B600, etc. These codes represent the control circuit load which may be controlled by the device. The significance of each code is shown in the tables below. Standard Duty indicates ratings under Codes B and P and Heavy Duty indicates ratings under Codes A and N for the marked voltage rating.

RATING CODES FOR AC CONTROL-CIRCUIT CONTACTS AT 50 AND 60 Hz

Contact Rating Code Dsg ^a	Thermal Continuous Test Current	Max Current Amps ^b										Max Volt-amps		
		120 V			240 V		480 V		600 V					
		Amps	Make	Break	Make	Break	Make	Break	Make	Break	Make			Break
		10	60	6.00	—	—	—	—	—	—	7200			720
		A150	10	60	6.00	—	—	—	—	—	—			7200

Contact Rating Code Dsg ^a	Thermal Continuous Test Current		Max Current Amps ^b								Max Volt-amps	
			120 V		240 V		480 V		600 V			
	Amps	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break	
	A300	10	60	6.00	30	3.00	—	—	—	—	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720	
B150	5	30	3.00	—	—	—	—	—	—	3600	360	
B300	5	30	3.00	15	1.50	—	—	—	—	3600	360	
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360	
C150	2.5	15	1.5	—	—	—	—	—	—	1800	180	
C300	2.5	15	1.5	7.5	0.75	—	—	—	—	1800	180	
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180	
D150	1.0	3.60	0.60	—	—	—	—	—	—	432	72	
D300	1.0	3.60	0.60	.180	0.30	—	—	—	—	432	72	
E150	0.5	1.80	0.30	—	—	—	—	—	—	216	36	

^aThe numerical suffix designates the maximum voltage design values which are to be 600 V, 300 V and 150 V for suffixes 600, 300 and 150, respectively.

^bFor maximum ratings at voltages between the maximum design value and 120 V, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage. For voltages below 120 V, the maximum make current is to be the same as for 120 V, and the maximum break current is to be obtained by dividing the break volt-amperes by the application voltage, but are not to exceed thermal continuous test current.

Added Table 1 Effective June 3, 1976**RATING CODES FOR DC CONTROL-CIRCUIT CONTACTS**

Contact Rating Code Designation ^a	Thermal				Max
	Continuous				Make or
	Test	Max Make or Break ^b			Break
	Current	Current Amps			V Amps
Amps		125 V	250 V	301 to 600 V	at 300 V or Less
N150	10	2.2	—	—	275
N300	10	2.2	1.1	—	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	—	—	138
P300	5.0	1.1	0.55	—	138
P600	5.0	1.1	0.55	0.20	138

^aThe numerical suffix designates the maximum voltage design values which are to be 600 V, 300 V and 150 V for suffixes 600, 300 and 150, respectively.

^bFor maximum ratings at 300 V or less, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage, but are not to exceed the thermal continuous test current.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.").

Combination Motor Controllers (NKJH)

Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

The product is marked "Combination Motor Controller" to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

An open type combination motor controller is intended for factory installation in a switchboard, motor control center, industrial control panel or the like, or for field installation in an enclosure for industrial control equipment, a cabinet or a cutout box.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Combination Motor Controller" or "Comb. Mtr. Cntrlr".

Motor Controllers, Float- and Pressure-operated (NKPZ)

This listing covers the following devices:

Float operated switches, including weight-operated switches

Pressure-operated switches, including vacuum-operated switches

Devices listed in this section are for direct control of motors; for use in control circuits of magnetic motor controllers and the like; and for control of other types of loads.

Unless otherwise marked, these devices are intended for use only with air, water, or other nonhazardous fluids.

Float- and pressure-operated switches which have been investigated for use in connection with automatic sprinkler or similar protective equipment are listed in the Fire Protection Equipment Directory under the Sprinkler System and Water Spray System Devices section.

The basic standard used to investigate products in this category is UL508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.").

Magnetic (NLDX)

This listing covers the following devices:

Across-the-line starters

Across-the-line starters with motor circuit switches

Reduced voltage starters such as Autotransformer, part-winding wye-delta, reactance and resistant type

Speed regulators

Combined starters and speed regulators

Magnetic switches for controlling other than motor loads are listed under Industrial Control Equipment — Switches, Magnetically Operated.

Magnetic motor controllers have been tested to determine their acceptability for continuous operation at their marked rated load.

The basic standard used to investigate products in this category is UL508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.").

Motor Controllers, Manual (NLRV)

This category covers the following devices:

Across-the-line starters

Autotransformer starters

Reactance type starters

Resistance type starters

Speed Regulators

Combined starters and speed regulators

The basic standard used to investigate products in this category is UL508, "Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Manual Motor Controller" or "Man. Mtr. Cntrlr".

Motor Controllers, Miscellaneous (NMFT)

This listing covers the following devices:

Combined Manual and Magnetic Starters

Flow Operated Switches

Machine Operated Switches

Proximity Operated Switches

Semi-magnetic starters

Solid state reduced voltage starters

Thermal Overload Switches

This Listing also includes miscellaneous solid state motor controllers and their accessories which have been reconditioned. Reconditioned miscellaneous solid state motor controllers and their accessories may also be referred to as rebuilt. Reconditioned miscellaneous solid state motor controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned miscellaneous solid state motor controllers and their accessories are subject to the same requirements as new miscellaneous solid state motor controllers and their accessories.

Devices Listed in this section are for direct control of motors. Devices for use in control circuits of magnetic motor controllers and the like are listed in the section for Auxiliary Devices.

The basic standard used to investigate products in this category is UL508, "Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.").

Power Conversion Equipment (NMMS)

This category covers equipment that supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or Transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power Conversion Equipment may be of the open or enclosed type. This equipment is intended for use in ordinary locations in accordance with Article 430 and 440 of the National Electrical Code.

Power Conversion Equipment incorporating overload protection for motors and not intended for remote or external motor overload protection are marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection, is marked to indicate motor protection such as thermal overload relays or a thermally protected motor must be otherwise provided.

Power Conversion Equipment is marked with input and output electrical ratings.

The basic standards used to investigate products in this category are UL 508C, "Power Conversion Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the front of this directory) together with the word "LISTED," a control number and the following product name: "Industrial Control Equipment" (or "Ind. Cont. Eq."), or "Power Conversion Equipment".

MISCELLANEOUS APPARATUS (NMTR)

This listing covers the following devices:

Amplifier Cards	Dimmers (including theater type M
Brakes	Electronic)
Circuit Monitors	Autotransformer
Clutches	Power Supply
Cutout Bases for	Reactance
Thermal Cutouts	Resistance
Resistors	Selecting Systems
Potentiometers	Variable-voltage Autotransformers
Rheostats	Phase converters
Battery charging	Enclosed Slip Rings
Field	Indicator Interface
General use	Injection System
Regulating	

A brake or clutch may consist of several parts with the Listing Mark appearing on the main electrical part (i.e., field). Where other part(s) are essential to complete a Listed assembly, the basic unit is marked to indicate the parts needed.

The basic standard used to investigate products in this category is UL508, "Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: "Industrial Control Equipment" (or "Ind. Cont. Eq.").

PROGRAMMABLE CONTROLLERS (NRAQ)

This Listing covers programmable industrial control systems utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. These Listings also include power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This Listing also includes programmable controllers and their accessories which have been reconditioned. Reconditioned programmable controllers and their accessories may also be referred to as rebuilt. Reconditioned programmable controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned programmable controllers and

their accessories are subject to the same requirements as new programmable controllers and their accessories.

All products covered by this Listing are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

The basic standard used to investigate products in this category is UL 508 electrical "Industrial Control Equipment".

This Listing does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil-fired appliances. For those controls, see Primary Safety Controls (MCCZ) in the Flammable and Combustible Liquids and Gases Equipment Directory.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated) together with the word "LISTED", a control number and --- product name: "Industrial Control Equipment" (or "Ind. Cont. Eq.") or this product name preceded by either the word "Reconditioned" or "Rebuilt".

PROTECTIVE RELAYS (NRGU)

This Listing covers relays of types directly associated with power switchgear. It does not cover overload relays of types designed primarily for industrial control or types used with communication, traffic signaling, computer switching, or other equipment not intended for the direct control of power equipment.

Typical devices eligible for Listing under this category are instantaneous current relays, voltage unbalance relays, high speed differential relays, dc timing relays, time overcurrent relays, reverse power relays and the like. Instrument transformers are not generally covered as part of the Listing.

These devices are intended to make or transfer current only, and to operate only under abnormal conditions.

These devices are intended for use in circuits rated 300 volts maximum.

The basic standard used to investigate products in this category is UL508, "Industrial Control Equipment". Products which include ground fault protection for equipment, are investigated for compliance with the requirements in the Standard for Ground-Fault Sensing and Relaying Equipment, UL 1053.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq. ").

PROXIMITY SWITCHES (NRKH)

USE

This category covers electronic switching devices that are actuated by position of an object without mechanical contact with the object. These proximity switches respond to inductive, capacitive or photoelectric effects.

These devices are for use on industrial machinery or mass production industrial equipment as defined by NFPA 79, "Electrical Standard for Industrial Machinery."

PRODUCT MARKINGS

The devices are marked with electrical ratings. At least one rating is marked on the product and additional ratings may be marked on an instruction sheet shipped with the device.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Industrial Control Equipment" (or "Ind. Con. Eq. ").

SWITCHES, INDUSTRIAL CONTROL (NRNT)

This listing cover the following products:

- Magnetically operated switches
- Manually operated switches
- Meter switches

Photoelectric switches

Solid state switches

Switches rated in horsepower and with or without pilot duty ratings for use in control circuits are listed under "Motor Controllers."

Open type switches are listed for use as parts of equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type switches may be employed.

Switches have been tested to determine their acceptability for continuous operation at their marked rated load.

The basic standard used to investigate products in this category is UL508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq. ").

INDUSTRIAL CONTROL EQUIPMENT, PROGRAMMABLE CONTROLLERS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (NWCS)

This category covers products that have been investigated in accordance with IEC Publication 204-1, Electrical Equipment of Industrial Machines. These products may also be provided with a Listing Mark of Industrial Control Equipment, Programmable Controllers. For additional information, see Industrial Control Equipment, Programmable Controllers, (NRAQ) in the Electrical Construction Equipment Directory.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

For those products which are also Listed, the Classification Marking includes the appropriate Listing Mark and the statement: "Also Classified by Underwriters Laboratories Inc. in accordance with IEC Publication 204-1".

For those products which are not also Listed, the Classification Marking consists of the statement: "Classified by Underwriters Laboratories Inc. in accordance with IEC Publication 204-1 and a control number. Additionally, the Classification Marking may include the symbol UL in a circle in conjunction with the word "CLASSIFIED".

INSTRUMENTATION TRAY CABLE (NYTT)

GENERAL

This category covers Type ITC instrumentation tray cable for use only in industrial establishments in accordance with Article 727 of NFPA 70, "National Electrical Code" (NEC). The cable consists of two or more insulated copper or thermocouple alloy conductors enclosed within a nonmetallic jacket. The cable may have a metal sheath or armor over the nonmetallic jacket, and may contain grounding conductors and/or optical fiber members.

The cable is rated 300 V and is intended for use on circuits rated 150 V or less and 5 A or less. The cable is Listed in conductor sizes 22 AWG to 12 AWG. Conductor sizes within a cable may be mixed.

Regarding cable seals outlined in Article 501 of the NEC, Type ITC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for inability to transmit gases through its core.

PRODUCT MARKINGS

The cable identification "TYPE ITC" and other markings are visible on the surface of the nonmetallic jacket.

Cable with thermocouple alloy conductors is intended for thermocouple extension use only and is so marked or has the marking "THCPL EXTN."

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF."

Cable that has been evaluated in accordance with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" is marked with the suffix "-LS."

Cable investigated for direct burial in the earth is marked "DIRECT BURIAL" or "DIR BUR."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2250, "Instrumentation Tray Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Instrumentation Tray Cable" or "Type ITC."

INSULATING DEVICES AND MATERIALS (NYYV)**INSULATING BUSHINGS (NZMT)**

This Listing covers insulating bushings for the protection of wires, cables and flexible cords where they pass through walls or barriers of metal.

Insulating bushings for use on the ends of conduit in boxes, gutters, etc. are Listed under Conduit Fittings.

Insulating bushings for use on the ends of rigid or flexible conduit, electrical metallic tubing, or armored cable, where a change to open wiring is made, are Listed under Outlet Bushings and Fittings.

The basic standard used to investigate products in this category is UL 635, "Insulating Bushings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Bushings", "Insulated Bushing".

INSULATING TAPE (OANZ)

This listing covers rubber insulating tape for insulating joints and splices in electrical conductors where an outer covering of protective material, such as friction tape, is to be applied over the insulating tape.

This listing also covers thermoplastic tapes for use as the sole insulation and covering of joints and splices in electrical conductors.

These tapes are suitable for use on insulated conductors at temperatures not exceeding 80°C (176°F), and, if so designated and marked, meet the following special requirements:

FLAME RETARDANT — Indicates that an insulating tape complies with the requirements for flame retardancy.

COLD RESISTANT — Indicates that an insulating tape may be used to insulate splices while subjected to temperatures down to -10°C.

WEATHER RESISTANT — Indicates that an insulating tape is suitable for exposed outdoor use.

The basic standard used to investigate products in this category is UL510, "Insulating Tape".

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and one of the following product names as appropriate: "Insulating Tape", "Insul. Tape", "Electrical Tape", "Elec. Tape", "Electrical Insulating Tape", "Elect. Insul. Tape" or other appropriate product name.

INSULATING DEVICES AND MATERIALS, MISCELLANEOUS (OCDT)

The basic standards used to investigate products in this category are UL746A, "Polymeric Materials-Short Term Property Evaluations", UL746B, "Polymeric Materials-Long Term Property Evaluations" and UL746C, "Polymeric Materials-Use in Electrical Equipment Evaluations".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Insulating Link", "Insulating Cover", "Insulating Closure", or other appropriate product name.

IRRIGATION CABLE (OFFY)**GENERAL**

This category covers irrigation cable for use with electrically driven or controlled irrigation machines in accordance with Article 675 of NFPA 70, "National Electrical Code."

Irrigation cable used to interconnect enclosures on the structure of an irrigation machine is an assembly of stranded, insulated conductors with nonhygroscopic fillers in a core of moisture and flame resistant, nonmetallic material overlaid with a metallic covering and jacketed with a moisture, corrosion and sunlight-resistant nonmetallic material. Irrigation cable is suitable for direct burial in the earth and may, optionally, be so marked.

This cable may consist of a composite of power, control and grounding conductors in Sizes 18 AWG and larger, stranded copper, and is rated 75°C and 600 V.

RELATED PRODUCTS

Fittings for use with this cable are covered under Outlet Bushings and Fittings (QCRV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1263, "Outline of Investigation for Irrigation Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Cables."

IRRIGATION CABLE ASSEMBLIES (OFJZ)

This listing covers Irrigation Cable Assemblies consisting of Listed Irrigation Cable terminated at each end in special purpose fittings, for use with Irrigation Equipment in accordance with Article 675 of the National Electrical Code. These assemblies are connecting devices used to interconnect multiple parts of irrigation equipment as permitted by the National Electrical Code.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Cable Assembly".

LAMPHOLDERS (OIMZ)**LAMPHOLDERS, ELECTRIC DISCHARGE (OJAX)****More Than 1000 Volts (OJOV)****USE**

This category covers lampholders and electrode receptacles for use with electric discharge lamps and tubes.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 542, "Lampholders, Starters, and Starter Holders for Fluorescent Lamps" and UL 879, "Electrode Receptacles for Gas-Tube Signs."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder" or "Electric Discharge Lampholder" or other appropriate product name as shown in the individual Listings.

Lampholders, Electric Discharge, 1000 Volts or Less (OKCT)

This listing covers lampholders and combination lampholders with starter holders for use with electric discharge or fluorescent lamps. Sepa-

rate starter holders are Listed under Electric Discharge Lamp Control Equipment — Holders for Automatic Starters.

The basic standard used to investigate products in this category is UL542, "Lampholders, Starters, and Starter Holders for Fluorescent Lamps".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Electric Discharge Lampholder", or other appropriate product name.

LAMPOLDERS, FITTINGS (OKQR)

This listing covers attachments and parts for use with screw-shell lampholders to modify the lampholders for certain conditions of usage.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Lampholder Fitting", "Shadeholder", or other appropriate product name.

LAMPOLDERS, INCANDESCENT (OLDZ)

Lampholders, Adapters (OLRX)

This listing covers screw-shell lamp adapters. Included are adapters for converting intermediate to candelabra, medium to candelabra, medium to intermediate, mogul to medium, medium to medium, mogul to mogul, parallel attachment plug blades to medium or candelabra, tandem attachment plug blades to medium.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Adapter", "Lampholder Adapter", "Incandescent Lampholder Adapter", or other appropriate product name.

Lampholders, Candelabra and Miniature (OMFV)

This listing covers screw-shell lampholders of the candelabra and miniature base sizes.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used in addition to the paper covering on the screw-shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

Miniature lampholders may be used for decorative lighting systems, Christmas tree lighting outfits and similar purposes.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Miniature Lampholder", "Candelabra Lampholder".

Lampholders, Intermediate Base (OMTT)

This listing covers screw-shell lampholders of the intermediate base size.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used, in addition to the paper covering on the screw-shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Intermediate Lampholder", "Incandescent Lampholder".

Lampholders, Medium Base (ONHR)

This listing covers screw-shell lampholders of the admedium and medium base sizes.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used, in addition to the paper covering on the screw-shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

Admedium base not for use with ordinary incandescent lamps.

Switched lampholders are tested on circuits involving a potential to ground of 125 volts.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Medium Lampholder", "Incandescent Lampholder".

Lampholders, Mogul Base (ONUZ)

This listing covers screw-shell lampholders of the mogul base size. Switched lampholders are tested on circuits involving a potential to ground of 125 volts.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Mogul Lampholder", "Incandescent Lampholder".

Lampholders, Miscellaneous (OOIX)

This listing covers lampholders for lamps which employ other than the usual screw-shell bases or are designed for specialized uses.

The basic standard used to investigate products in this category is UL496, "Edison Base Lampholders".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Lampholder", "Miscellaneous Lampholder", "Incandescent Lampholder".

LIGHTING AND POWER EQUIPMENT, AUXILIARY (OUST)

USE AND INSTALLATION

This category covers equipment to be used in conjunction with a facility emergency lighting and power system. This equipment has not been evaluated for compliance with the performance criteria of Article 700 of the National Electrical Code (ANSI/NFPA 70), the Life Safety Code (ANSI/NFPA 101) or the Uniform Fire Code. It may consist of battery assemblies, unit equipment, remote light sources, illuminated signs, or related devices.

This equipment is for use in unclassified areas and is intended for indoor, dry location use only unless marked for damp or wet locations.

**2003 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY**
RELATED PRODUCTS

For additional information, see Emergency Lighting and Power Equipment (FTBR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Auxiliary Lighting Equipment," "Auxiliary Power Equipment."

LIGHTNING PROTECTION (OVGR)

LIGHTNING CONDUCTORS, AIR TERMINALS AND FITTINGS (OVTZ)

Lightning protection components are intended to be installed to provide a lightning protection system complying with UL 96A, "Installation Requirements for Lightning Protection Systems."

REQUIREMENTS

The basic standard used to investigate products in this category is UL 96, "Lightning Protection Components."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Lightning Conductor," "Air Terminal," "Fitting" or other appropriate product name.

LIGHTNING PROTECTION SYSTEM INSTALLATIONS (OWAY)

GENERAL

This category covers the installation of lightning protection systems on structures (as limited by UL 96A) to protect them from damage by lightning. The issuance of a Certificate is evidence that the installation of the lightning protection system (1) has been made by an installer that Subscribes to UL's Follow-Up Service, (2) employs materials subject to factory inspection service and bears the UL Mark, and (3) is subject to a field inspection program covering proper installation of the system. The components of the system are described in UL 96A, "Installation Requirements for Lightning Protection Systems" and UL 96, "Lightning Protection Components."

RELATED PRODUCTS

For manufacturers of Listed ground rods suitable for use in installations of lightning protection equipment, see Grounding and Bonding Equipment (KDER).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 96A, "Installation Requirements for Lightning Protection Systems."

LOOK FOR THE CERTIFICATE FOR NEW INSTALLATIONS

The Certificate of Underwriters Laboratories Inc. is the only method provided by UL to identify lightning protection systems covered under its Listing and Follow-Up Service. The Certificate is limited to the number of years for which it has been issued and must be renewed to remain in effect.

Underwriters Laboratories Inc. maintains a factory inspection service for counterchecking conductors, air terminals and fittings, and also a field inspection service for counterchecking installations.

SURGE ARRESTERS (OWHX)

USE

This category covers surge arresters intended to afford protection against surge-related damage to secondary distribution wiring systems and/or to equipment connected thereto. These devices are for use on alternating current power circuits and are intended to be installed in accordance with Article 280 of the National Electrical Code.

**2003 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY 69**

Antenna discharge units intended solely for protection against voltage surges on antennas for radio and television receiving appliances are Listed under Television Equipment (WZVQ) in the Electrical Appliance and Utilization Equipment Directory. Transient voltage surge suppressors are intended for use only on the load side of the main service disconnect and are Listed under Transient Voltage Surge Suppressors (XUHT).

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/IEEE C62.11, "Standard for Metal-Oxide Surge Arresters for AC Power Circuits." All other types of surge arresters are investigated to IEEE C62.1-1989, "Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Surge Arrester," "Secondary Surge Arrester," "Secondary MOV Surge Arrester," "Secondary Metal-Oxide Surge Arrester," "Secondary Valve Type Surge Arrester" or "Distribution Light Duty Surge Arrester."

SURGE ARRESTERS CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (OWIW)

This category covers surge arresters which have been investigated and found suitable for use as plug-in devices in specified panelboards. The surge arresters are Classified for use in specified panelboards in accordance with the details on the surge arrester or in the publication provided therewith.

The basic Standard used to investigate metal oxide surge arresters is IEEE C62.1-1989, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits. All other types of surge arresters are investigated to IEEE C62.1-1989, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits.

For additional information see the Guide information for Surge Arresters (OWHX).

In addition to the Classification Marking, one of the following statements or the compatibility list is marked on the side of the surge arrester: "For Catalog Numbers of Compatible Panelboards, refer to the installation instructions provided with the surge arrester" or "For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. _____ provided with this surge arrester." The referenced publication is a compatibility list which tabulates the company name, catalog number and electrical ratings of the Classified surge arrester in addition to the company name and catalog number of the applicable UL Listed panelboards which the Classified surge arrester has been investigated for use in. One copy of the compatibility list is provided with each surge arrester.

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "CLASSIFIED," a control number and one of the following product names as appropriate: "Surge Arrester," "Secondary Surge Arrester," "Secondary MOV Surge Arrester," "Secondary Metal-Oxide Surge Arrester," "Secondary Valve Type Surge Arrester".

In the Classification Marking the words "Underwriters Laboratories Inc." may be abbreviated "Underwriters Lab. Inc." or "Und. Lab. Inc."

Included as part of the Classification Marking on the surge arrester is the statement: "For Catalog Numbers of Compatible Panelboards, refer to the installation instructions provided with the surge arrester".

SURGE PROTECTIVE DEVICES OVER 600 VOLTS (OWJU)

This listing covers Surge Arresters intended to afford protection against Surge related damage to distribution wiring systems and/or to equipment connected thereto. These devices are for use on alternating-current power circuits and are intended to be installed in accordance with Article 280 of the National Electrical Code. These devices are rated at voltages of 1000 volts and higher, but not higher than 38k V.

The basic standard used to investigate products in this category is ANSI C62.1, "Standard for Surge Arresters for AC Power Circuits". See ANSI C62.2 "Guide for the application of valve type Surge Arresters for AC Systems" for further application information.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products

includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Arrester".

SURGE PROTECTORS AND ISOLATORS FOR USE ON CATHODICALLY PROTECTED SYSTEMS (OWKT)

This category covers surge protectors and isolators used to provide AC grounding and DC blocking for cathodic protection of underground pipelines and similar installations. They may also be used to minimize galvanic corrosion between structures of dissimilar metals.

These devices have been investigated for providing effective grounding path characteristics as noted in the 1999 National Electrical Code, Section 250-2(d). Additionally, these devices have been investigated for providing isolation of objectionable direct current ground currents as noted in the 1999 National Electrical Code, Section 250-6(e).

The Listing mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this directory) together with the word "LISTED", a control number, and the appropriate product name as shown in the individual Listing.

LIMITED COMBUSTIBLE CABLE (OWKZ)

GENERAL

This category covers electrical and optical fiber cable that meets the limited combustible and smoke developed requirements for cable in ceiling cavity and raised floor plenums in accordance with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." This cable also meets the requirements for cable used in ducts, plenums and other spaces used for environmental air in accordance with Articles 725, 760, 770, 800, 820 and 830 of NFPA 70, "National Electrical Code."

This cable has a maximum Potential Heat value of 3500 Btu/lb when tested in accordance with NFPA 259 (date), "Standard Test Method for Potential Heat of Building Materials." This cable has a maximum smoke developed index of 50 and a maximum flame spread index of 25 when tested in accordance with UL 723 (NFPA 255), "Test for Surface Burning Characteristics of Building Materials" before and after exposure to elevated temperature and humidity. The cable also meets the requirements for plenum cable in one or more of the following product categories:

Power Limited Circuit Cable (QPTZ) - Types CL2P or CL3P
Communications Cable (DUZX) - Types CMP or MPP
Power Limited Fire Alarm Cable (HNIR) - Type FPLP
Nonpower Limited Fire Alarm Cable (HNHT) - Type NPLFP
Optical Fiber Cable (QAYK) - Types OFNP or OFCP
Community Antenna Television Cable (DVCS) - Type CATVP
Network Powered Broadband Communications Cable (PWIP) - Type BLP

PRODUCT MARKINGS

This cable is identified by the marking "Limited Combustible FHC 25/50" on the surface of the jacket or on a marker tape under the jacket. This marking is immediately followed by one of the Type designations shown above. The cable also has the required markings including optional markings as indicated in the Guide Information for the categories shown above. This cable may also be Verified for transmission performance if authorized in the Guide Information for the product categories shown above, and will bear the appropriate performance verification marking.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Limited Combustible Cable."

Cable which is also Verified to the UL Data Transmission Performance Category Marking Program has the marking "Verified to UL Performance Category Program," or the UL Verification Mark along with the words "Performance Category Program" together with the Listing Mark information on the tag, reel or smallest unit container. Cable which is also Verified to another transmission performance specification has the marking "Verified in Accordance with [Specification name and/or number]" or the UL Verification Mark along with the applicable Specification name and/or number together with the Listing Mark information on the tag, reel or smallest unit container.

LOW VOLTAGE AC POWER SWITCHING DEVICES (PAPU)

This listing category covers low voltage power switching devices which are sub-classified into low voltage AC power circuit breakers, low voltage DC power circuit breakers, low voltage AC power circuit protectors, low voltage AC integrally fused power circuit breakers and low voltage power switching device adapter.

The low voltage power switching devices have been investigated for continuous duty at 100 per cent of their current ratings and are designed to provide service entrance, feeder, or branch circuit protection. They may be manually and/or electrically operable.

Low voltage power switching devices, enclosures, and adapters as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and are on a wiring diagram or other readily visible location.

Stationary equipment is normally bus connected. However, terminal pads are provided which can accommodate field installed pressure wire connectors.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less and on the use of 75 C wire for higher amp rated circuits.

Low voltage power switching devices that have been found to be suitable for use with an accessory are marked to indicate the accessory(s), the electrical rating and proper connections (if not obvious).

Low voltage power switching devices without enclosures are intended for use only in Listed enclosures or as part of other Listed equipment which has been evaluated and are marked for use with a specific low voltage power switching device.

For additional information, see individual Guide Cards covering low voltage AC power circuit breakers, low voltage AC integrally fused power circuit breakers, low voltage AC power circuit protectors, low voltage DC power circuit breakers, low voltage power switching device adapters, low voltage AC power circuit breaker current limiters, and low voltage AC fuse draw out.

ACCESSORIES, LOW VOLTAGE AC POWER SWITCHING DEVICES (PAQF)

This listing covers accessories such as shunt trip devices, undervoltage trip devices, alarm switches and auxiliary switches which are intended for field installation for use only with specific low voltage power switching devices. Correct combinations of low voltage power switching devices and accessories are indicated by markings on or with the accessory and/or the low voltage power switching device.

The basic standard used to investigate products in this category is UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures," and ANSI C37.13 and ANSI C37.50.

For additional information, see Low Voltage Power Switching Devices (PAPU).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage Power Breaker Accessory", or other appropriate product name.

ADAPTERS, LOW VOLTAGE AC POWER SWITCHING DEVICES (PAQQ)

This listing covers equipment designed to adapt low voltage power switching devices to receiving devices such as individual enclosures, dead front switchboards (switchgear), panelboards, etc., and field installation is intended only in those receiving devices which are specifically marked for their use.

These adapters have been investigated in conjunction with power switching devices and have been found suitable to carry 100 per cent of the current rating of the power switching device and to withstand the maximum fault current levels specified on the power switching device.

The adapters are marked to indicate which power switching device they may be used with.

The basic standards used to investigate products in this category are UL1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures" and ANSI C37.50 and ANSI/IEEE C37.20.1.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage Power Switching Device Adapter".

**LOW VOLTAGE AC FUSE DRAW OUT
(PAQT)**

This listing covers fuse draw outs. These products are intended to be installed in switchgear and connected in series with Listed low voltage ac power circuit breakers in order to extend the short-circuit current rating of the circuit breaker.

Fuse draw outs consist of fuses or current limiters and an open fuse trip device in a draw out type assembly.

These devices have been investigated in combination with specific circuit breakers for use on circuits having an available fault current of 200,000 rms symmetrical amps, maximum, 3-phase.

The open fuse trip device will cause the associated circuit breaker to trip when any fuse or current limiter opens.

Fuse draw outs are marked with maximum voltage, frequency, continuous current, short-circuit current and the type or catalog number designation of the circuit breaker with which it is intended to be used.

The basic standards used to investigate products in this category are UL1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures" and ANSI C37.50 and ANSI/IEEE C37.20.1.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Low Voltage AC Fuse Draw-Out".

**LOW VOLTAGE AC POWER CIRCUIT
BREAKERS (PAQX)**

This category covers low voltage power circuit breakers specifically designed to provide service-entrance, feeder, or branch circuit protection or serve as a disconnecting means and also covers power circuit breaker enclosures. They are covered by the classifications indicated by the label designation as follows:

"Low voltage AC power circuit breaker" — without enclosure, and with or without non-interchangeable trip devices.

"Low voltage AC power breaker frame" — frame only of power circuit breaker with provision for interchangeable trip devices. A Listed "Low voltage power circuit breaker frame" is Listed for use only with Listed "Low Voltage AC power circuit breaker trip device".

"Low voltage AC power circuit breaker trip device" — trip device only of power circuit breaker having provisions for interchangeable trip devices.

"Low voltage AC power switching device enclosure" — enclosure only for individual 1-, 2- or 3-pole power circuit breaker.

Low voltage AC power circuit breakers are marked with maximum voltage, frequency, continuous current, short-time current, short circuit current (interrupting rating) and control voltage ratings. The short time current rating is the designated limit of fault current that the low voltage AC power circuit breaker can successfully carry for a short interval. Other rating information such as the nominal design voltage, and time-delay overcurrent trip setting may be provided.

The short-circuit current rating of a low voltage ac power circuit breaker may be extended by connecting a low voltage ac fuse draw out in series. When such connection is used, the circuit breaker is provided with means for tripping by way of a signal from an open fuse trip device. The open fuse trip device may be either on the fuse draw out or on the circuit breaker. Circuit breakers are marked with the catalog or type designation of the fuse draw out with which they are intended to be used.

The frame size determines the maximum continuous current rating for all parts of a low voltage AC power circuit breaker except the coils of the direct acting trip device. The rating of the trip device determines the actual continuous current rating.

The trip devices may contain ground-fault current, longtime delay overcurrent, short-time-delay overcurrent and instantaneous overcurrent trip elements which may be adjustable. The tolerance of the marked position of the longtime delay overcurrent trip setting is plus or minus ten percent.

A ground fault current trip element is one that functions at all values of current at or above a predetermined value of fault current to ground.

An instantaneous overcurrent trip element is one that functions with no purposely delayed action at all values of current at or above a predetermined value of overcurrent.

A long time overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short time or instantaneous pick-up settings of the circuit breaker.

A short time delay overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short time current rating of the circuit breaker.

Circuit breakers without trip devices cannot of themselves respond to overcurrent, short circuit or ground faults and are marked: "No Over-Current Protection Provided" or "If Over-Current Protection is Required, Use With Type _____ Protective Relays". Circuit breakers without trip devices can respond to overcurrent when properly connected to protective relays.

For additional information, see Low Voltage Power AC Switching Devices.

The basic standards used to investigate products in this category are UL1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures" and ANSI C37.13 and ANSI C37.50.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Low-Voltage AC Power Circuit Breaker", "Low Voltage AC Power Breaker Frame", "Low Voltage AC Power Circuit Breaker Trip Unit", "Low Voltage AC Power Switching Device Enclosure".

**Low Voltage AC Power Circuit Breakers, Naval
Use (PARU)**

This category covers circuit breakers that have been evaluated and found suitable for application aboard noncombatant and auxiliary naval ships.

These circuit breakers are intended for use in enclosures and are rated up to 5000 A, 635 V AC.

ADDITIONAL INFORMATION

For additional information, see Low Voltage AC Power Circuit Breakers (PAQX), Low Voltage AC Power Switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Low Voltage AC Power Circuit Breaker", "Low Voltage AC Power Circuit Breaker Frame" or "Low Voltage AC Power Circuit Breaker Trip Unit."

Secondary Network Protectors (PARZ)**USE**

This category covers secondary network protectors for use in spot or grid networks rated 600 V or less. These protectors consist of a circuit breaker and its control equipment. They are used for automatically disconnecting a transformer from a secondary network in response to predetermined electrical conditions on the primary feeder or transformer. They are also used for connecting a transformer to a secondary network either through manual control or automatic control responsive to predetermined electrical conditions on the feeder and the secondary network.

PRODUCT MARKINGS

Each secondary network protector is marked with the company name, model number and its electrical ratings, which includes the maximum short circuit rating of the device.

ADDITIONAL INFORMATION

For additional information, see Low Voltage AC Power Circuit Breakers (PAQX), Low Voltage AC Power Switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is IEEE C57.12.44, "IEEE Standard Requirements for Secondary Network Protectors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Secondary Network Protector."

**LOW VOLTAGE AC INTEGRALLY FUSED
POWER CIRCUIT BREAKERS (PASQ)**

This listing covers low voltage AC integrally fused power circuit breakers rated 600 volts maximum. Low voltage AC integrally fused power circuit

circuit breakers include all the mechanical features of low voltage AC power circuit breakers and in addition have current limiters or current limiting fuses which function to increase the fault current interrupting rating of the low voltage AC integrally fused power circuit breakers.

These devices have been investigated for use on circuits having available fault currents of 200,000 rms symmetrical amps, maximum, three-phase.

Low voltage AC integrally fused circuit breakers are marked with maximum voltage, frequency, continuous current, short-circuit current (interrupting rating) and control voltage ratings. Other rating information such as the nominal design voltage and time-delay overcurrent tripping setting may be provided.

In addition to overcurrent trip elements of the low voltage AC power circuit breakers, these are provided with anti-single phase tripping device which automatically opens the circuit breaker contacts in response to circuit interruption by the current limiter or the current limiting fuse.

The basic standards used to investigate products in this category are UL1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures" and ANSI C37.13 and ANSI C37.50.

For additional information, see Low Voltage AC Switching Devices.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage AC Integrally Fused Power Circuit Breaker".

LOW VOLTAGE AC POWER CIRCUIT PROTECTORS (PATT)

This listing covers low voltage AC power circuit protectors rated 240 volts or 480 volts, and have been investigated for use on circuits having available fault currents of 200,000 rms symmetrical amps maximum, three-phase.

The low voltage AC power circuit protector consists of a low voltage AC power circuit breaker that has been modified to omit the direct acting tripping devices and to include a Class L current limiting fuse in series with the load terminals of each pole.

The low voltage AC power circuit protectors are marked with maximum voltage, frequency, continuous current, short circuit current and control voltage(s) ratings. Other rating information such as switching current rating may be provided.

The basic standards used to investigate products in this category are ANSI C37.29 and ANSI C37.52.

For additional information, see Low Voltage Power AC Switching Devices.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage AC Power Circuit Protector".

LOW VOLTAGE DC POWER CIRCUIT BREAKERS (PAXW)

This listing covers low voltage DC power circuit breakers specifically designed to provide service-entrance, feeder or branch circuit protection. Low voltage DC power circuit breakers are separated into three types: general purpose, high speed and semi-high speed.

These products are marked with rated maximum voltage, rated continuous current, rated momentary current (when applicable), rated peak current (when applicable), rated short-time current, rated short-circuit current and rated control voltage.

These products are intended to be used in Listed enclosures or switchboards with Recognized or Listed adapters.

The basic standards used to investigate products in this category are UL1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures" and ANSI C37.14.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage DC Power Circuit Breaker".

TRIP DEVICES CLASSIFIED FOR USE IN LOW VOLTAGE AC POWER CIRCUIT BREAKERS (PAYK)

USE

This category covers trip devices suitable for use in place of the original trip device of a Low Voltage AC Power Circuit Breaker.

This category covers only the trip device in its ability to sense and respond to overcurrent and fault current conditions. It does not cover the circuit breaker on which the trip device is mounted.

For additional information see the Electrical Equipment for Use in Ordinary Locations (AALZ) and Low Voltage AC Power Circuit Breakers (PAQX).

REQUIREMENTS

The basic standards used to investigate products in this category are IEEE C37.59-1996, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment" which references IEEE C37.13-1990, "Low-Voltage AC Power Circuit Breakers Used in Enclosures," ANSI C37.17-1997, "Trip Devices for AC and General Purpose DC Low-Voltage Power Circuit Breakers" and ANSI C37.50-1989, "Low-Voltage AC Power Circuit Breakers Used in Enclosures-Test Procedures" and UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures."

LOOK FOR CLASSIFICATION MARKING ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Inc. to identify products produced under its Classification and Follow-Up Service.

TRIP DEVICE

CLASSIFIED BY

UNDERWRITERS LABORATORIES INC

IN ACCORDANCE WITH IEEE C37.59 — (date) _____
(Control number)

MANAGEMENT EQUIPMENT, ENERGY (PAZX)

USE

This category covers energy management equipment that energizes or de-energizes electrical loads to achieve the desired use of electrical power. This equipment normally controls electrical loads by responding to sensors or transducers monitoring power consumption, by sequencing, by cycling the loads through the use of preprogrammed data logic circuits, or any combination thereof. Devices responding to signals from a utility company may receive the signals over the power lines or as radio signals.

Typical loads controlled are space heating, air conditioning, lighting and other similar loads.

UNEVALUATED FACTORS

The effects of the controls on the performance ratings of the connected loads have not been evaluated.

PRODUCT MARKINGS

"Energy Management Equipment Enclosure," "Energy Management Equipment Enclosure Part," "Energy Management Equipment Subassembly" and "Energy Management Equipment Accessory" require modular labeling. The marking on the individual subassembly, or smallest container, will make reference to 1) a wiring diagram for interconnection of a system, and 2) the various combinations of subassemblies that may be employed to comprise the system unit.

RELATED PRODUCTS

Signal system units incorporating energy management systems are covered under Signal System Units (UDTZ) in the Electrical Appliance and Utilization Equipment Directory.

Switching devices operated by a clock mechanism and other similar type products used to energize or de-energize loads are covered under Switches, Clock-operated (WGZR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 916, "Energy Management Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Open Energy Management Equipment," "Enclosed Energy Management Equipment," "Energy Management Equipment Enclosure," "Energy Management Equipment Enclosure Part," "Energy Management Equipment Subassembly" or "Energy Management Equipment Accessory."

MARINA AND BOATYARD CABLE (PDYQ)

USE

This category covers cable for use as flexible branch circuit and feeder wiring in marinas and boatyards in accordance with Article 555 of NFPA 70, "National Electrical Code."

The cable is rated 600 V, 75°C and is suitable for exposure to sunlight, fresh water, salt water, gasoline, diesel fuel and lubricating oil.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marina and Boatyard Cable."

MEDIUM-VOLTAGE CABLE (PITY)

GENERAL

This category covers medium-voltage cable rated 5000 to 35,000 V intended for use and installation in accordance with Article 328 of NFPA 70, "National Electrical Code" (NEC).

The cable is single or multiconductor, aluminum or copper, with solid extruded dielectric insulation and may have an extruded jacket, metallic covering or combination of both over the single conductors or over the assembled conductors in a multiconductor power cable.

All insulated conductors rated higher than 8000 V have electrostatic shielding. Cable rated 5000 or 8000 V may be shielded or nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

PRODUCT MARKINGS

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90 or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only" indicating suitability for use only in dry locations at 90°C maximum.

Cable marked "oil resistant I" or "oil resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "sunlight resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays in accordance with Article 392 of the NEC is marked "for CT Use" or "for use in cable trays."

Cable with aluminum conductors is marked with the word "aluminum" or the letters "AL."

The cables is marked with the conductor size, voltage rating and insulation level (100 percent or 133 percent).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1072, "Medium-Voltage Power Cables."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Medium-Voltage Cable."

MEDIUM-VOLTAGE CABLE CLASSIFIED IN ACCORDANCE WITH UL 1072, WITH METRIC CONDUCTOR SIZES (PIVW)

GENERAL

This category covers medium-voltage cable rated 2001 to 35,000 V and in conductor sizes 10 through 500 sq mm.

The cable complies with all requirements specified in UL 1072, "Medium-Voltage Power Cables," except that metric conductor sizes are used instead of AWG sizes. The cable is for use in jurisdictions where metric conductor sizes are required or permitted.

The cable is single or multiconductor, aluminum or copper, with solid extruded dielectric insulation. An extruded jacket, metallic covering, or combination of both may be provided over single conductors or over the assembled conductors in a multiconductor power cable.

All insulated conductors rated 8001 V and higher have electrostatic shielding. Cable rated 2001 to 8000 V may be shielded or nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

PRODUCT MARKINGS

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90°C or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only."

Cable marked "oil resistant I" or "oil resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "sunlight resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays is marked "For CT Use" or "For Use In Cable Trays."

Cable with aluminum conductors is marked with the word "Aluminum" or the letters "AL."

Cable is marked with conductor size in sq mm, voltage rating and insulation level (100 percent or 133 percent).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1072, "Medium-Voltage Power Cables."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below:

**MEDIUM VOLTAGE CABLE
CLASSIFIED BY UNDERWRITERS LABORATORIES INC®
IN ACCORDANCE WITH UL 1072, WITH METRIC
CONDUCTOR SIZES
(Control No.)**

METAL-CLAD CABLE (PJAZ)

GENERAL

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset or thermoplastic insulated conductors. It is intended for installation in accordance with Article 330 of NFPA 70, "National Electrical Code" (NEC).

The cable consists of two or more insulated conductors; one or more grounding conductors, if required; one or more optional optical fiber members; and an overall metal sheath. The metal sheath is an interlocked metal tape, a corrugated metal tube or a smooth metal tube. A nonmetallic jacket may be provided under and/or over the metal sheath. Cable with metal armor, rated 5000 to 35,000 V is covered under Medium-voltage Cable (PITY) and is marked "Type MV or MC."

The equipment grounding conductor required within a cable with interlocked metal tape sheath may be insulated or bare and may be sectioned. Any additional grounding conductors have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors.

The sheath of the smooth or corrugated tube Type MC cable or a combination of the sheath and a supplemental bare or unstriped green insulated conductor is suitable for use as the required equipment grounding conductor. The supplemental grounding conductor may be sectioned. When sectioned, all sections are identical. Each additional green insulated grounding conductor has either a yellow stripe or a surface marking or both to indicate that it is an additional equipment or isolated grounding conductor. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-clad AL." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

Cable containing one or more optical fiber members is marked "MC-OE."

Cable with a nonmetallic outer jacket that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," and all unjacketed metal-clad cable may be marked with the suffix "LS."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1569, "Metal-Clad Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-Clad Cable"; metal-clad cable that contains aluminum conductor has the product name "Metal-Clad Aluminum Cable."

METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (PJHY)

This category covers Listed products that have also been investigated in accordance with IEC Publications 332-3, Tests on Electric Cables Under Fire Conditions; 502, Extruded Solid Dielectric Insulated Power Cables for Rated Voltages from 1 kV up to 30 kV; and 540, Test Methods for Insulations and Sheaths of Electric Cables and Cords (Elastomeric and Thermoplastic Compounds). These products are provided with the Listing Mark for Metal-Clad Cable (PJAZ) as described in the General Information section at the beginning of the Listing category.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking for these products includes the appropriate Listing Mark and the statement: "Also Classified by Underwriters Laboratories Inc. in accordance with IEC Publications 332-3, 502 and 540."

METAL-CLAD CABLE CONNECTORS, TYPE MC (PJOX)

GENERAL

This category covers fittings for use with metal-clad cable, Type MC, employing (a) interlocking aluminum or steel tape, (b) smooth aluminum tube or (c) corrugated aluminum or copper tube. This product is intended for installation and use in accordance with the following information and the limitations specified in Metal-clad Cable (PJAZ).

Connector Selection — Connectors are intended to be selected in accordance with the size and type of cable for which they are designated. Bronze connectors are intended for use only with cable employing corrugated copper tube. Aluminum connectors are intended for use only with cable employing corrugated aluminum, interlocking aluminum or smooth aluminum tube, unless marked otherwise on the carton (see **PRODUCT MARKINGS**).

Use in Concrete — Fittings made of aluminum are not considered suitable for use in concrete or cinder fill unless protected with asphalt paint or the equivalent. Fittings that are suitable for use in concrete are identified by a marking on the carton.

Grounding — Metal-clad cable connectors for use with corrugated aluminum or copper tube, or smooth aluminum tube, are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with NFPA 70, "National Electrical Code."

Dry and Wet Locations — Nonmetallic parts, such as glands or seals, are suitable for use at a temperature of 90°C in dry and wet locations. The fittings are suitable for use in dry or wet locations unless marked otherwise (see **PRODUCT MARKINGS**).

Use with Armored Cable — Metal-clad cable connectors also suitable for use with armored cable, Type AC, are so marked on the device or carton. Listed armored cable, Type AC, can be found under Armored Cable Connectors, Type AC (AWSX).

PRODUCT MARKINGS

Metal-clad cable fittings or the smallest unit shipping cartons are marked with (1) the range of cable diameters and the type of cable sheath (corrugated, interlocking or smooth), (2) the material of the sheath (aluminum, copper or steel) for which they have been investigated, (3) "Concrete-tight" if suitable for use in poured concrete, and (4) "For Type AC Cable" (or equivalent wording) if suitable for that use. Metal-clad cable fittings suitable for use only in dry locations are marked "Dry Locations" on the device and smallest unit carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when the size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-Clad (Type MC) Cable Connector."

METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES (PJPJ)

GENERAL

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and Classified in sizes 1.5 through 35 sq mm copper, 4.0 through 35 sq mm aluminum or copper-clad aluminum and employs thermoset or thermoplastic insulated conductors.

The cable complies with all the requirements specified in UL 1569, "Metal-Clad Cables," except that metric conductor sizes are used instead of AWG sizes. This cable is for use in jurisdictions where metric conductor sizes are required or permitted.

Type MC cable is of three designs (a) interlocked metal tape, (b) corrugated tube and (c) smooth tube, and all are intended for aboveground use except when marked for direct burial.

The equipment grounding conductor of Type MC cable of the interlocked metal tape type is to be used for grounding. The tube of corrugated or smooth tube Type MC Cable in combination with the equipment grounding conductor, when provided, is suitable for grounding; otherwise the tube by itself is suitable for grounding.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and sq mm size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-Clad AL." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1569, "Metal-Clad Cable."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below using the appropriate product name: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-Clad Cable"; metal-clad cable that contains aluminum conductors has the product name "Metal-Clad Aluminum Cable."

(Product Name)

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH UL 1569, WITH METRIC
CONDUCTOR SIZES**

(Control No.)

METER MOUNTING EQUIPMENT (PJSR)

Meter mounting equipment consists of an enclosure, wiring terminals and provision for fastening of the meter to the equipment. Meter mounting equipment does not include overcurrent devices, normally arcing parts, or the like. It may include provisions for current transformers but not the transformers.

Meter mounting equipment having provision for current transformers is marked to indicate the maximum transformer current rating.

Meter mounting equipment accommodating two or more meters is marked with an overall amp rating.

Meter mounting equipment Listed herein is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking will be on a wiring diagram or in another readily visible location, and will be independent of any marking on a terminal connector unless the terminal connector is an integral, non-removable part of the meter socket jaw.

Wire connectors in Listed meter mounting equipment are intended to accommodate one conductor only unless use with more than one conductor is clearly indicated on the wiring diagram or other readily visible location.

Unless the equipment is marked with both the size and temperature rating of wire to be used the termination provisions are based on the use of 75 C ampacities for wire.

Meter mounting equipment is marked with the enclosure type described in guide AALZ information.

Meter mounting equipment with a mounting post is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support. The mounting post is marked to indicate the proper ground level.

Meter mounting equipment with a mounting pedestal is intended to be mounted on a concrete slab.

Meter mounting equipment with a mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities.

Unless marked otherwise, meter mounting equipment with a post or pedestal is not intended to serve as the sole support of a mast for overhead wiring.

METER FITTINGS (PJVV)

Meter fittings are designed to accommodate bolt in type watt-hour meters and similar meters.

Ratings of Listed meter fittings are limited to 600 v, ac, maximum and to 400 amp maximum.

Meter fittings are marked with their short circuit withstand RMS symmetrical current rating in amps. For short circuit ratings exceeding 10KA, the marking will include the type and rating of overcurrent protection to be used with the meter fitting.

For additional information, see Meter Mounting Equipment.

The basic standard used to investigate products in this category is UL414, "Meter Sockets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter Fitting".

METER SOCKET BASES (PJWT)

Meter socket bases are bases intended to accommodate plug-in type watt-hour and similar meters rated for use with current transformers.

They are designed to be installed, with the meter, inside enclosures to allow for connection in accordance with the National Electrical Code.

Meter socket bases are rated 600 V, AC max. Meter socket bases rated over 30 A are marked with their short circuit withstand RMS symmetrical current ratings in amps. For short circuit current ratings exceeding 10 kA, the marking includes the type and rating of overcurrent protection to be used with the meter socket.

Meter socket bases are marked with a continuous amp rating and may, in addition, have a maximum use (intermittent) rating of not more than 125 percent of the continuous amp rating.

Meter sockets with meters protruding through the enclosure are Listed under the category of "Meter Sockets" (PJYZ).

The basic standard used to investigate products in this category is UL414, "Meter Sockets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word "LISTED", a control number, and the product name "Unenclosed Meter Socket".

METERING TRANSFORMER CABINETS (PJXS)

Metering transformer cabinets consist of an enclosure and provisions for accommodating current Transformers. They do not include the current transformers. They may have provision for the mounting of plug-in type watt-hour meters. They may also include wiring terminals and buses to accommodate bus type current transformers.

Metering transformer cabinet interiors are intended for field installation into enclosures. Unless marked for use in a specific enclosure, wiring space has not been investigated.

Ratings of Listed metering transformer cabinets and interiors are limited to 600 v ac maximum and to 6000A maximum.

Metering transformer cabinets intended for use with specific metering transformer cabinet interiors and the interiors themselves are marked with their short circuit withstand RMS symmetrical current rating in amperes.

For additional information, see Meter Mounting Equipment (PJSR).

The basic standard used to investigate products in this category is UL414, "Meter Sockets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Metering Transformer Cabinet" or "Metering Transformer Cabinet Interior".

METER SOCKETS (PJYZ)

Meter sockets comprise complete enclosures accommodating plug-in type watt-hour and similar meters. They provide terminating facilities for conductors of wiring systems recognized by the National Electrical Code.

The tightening torque required for terminal screws is specified by a marking.

Terminal wire connectors may be omitted and, if omitted a marking shall specify which connectors shall be used. Instructions for the field installation of connectors are provided with the connectors.

Except when marked "Top feed only" or "Bottom feed only" meter sockets are suitable for supply from either the upper or lower end of the enclosure.

Ratings of Listed meter sockets are limited to 600 v, ac, maximum and to 400 amp maximum through any meter.

Meter sockets rated over 30 amps are marked with their short circuit withstand RMS symmetrical current rating in amps. For short circuit ratings exceeding 10KA, the marking will include the type and rating of overcurrent protection to be used with the meter socket.

Meter sockets are marked with a continuous amp rating and may in addition have a maximum use (intermittent) amp rating of not more than 125 percent of the continuous amp rating.

For additional information, see Meter Mounting Equipment.

The basic standard used to investigate products in this category is UL414, "Meter Sockets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter Socket".

METER SOCKET ACCESSORIES (PKAX)

The category of meter socket accessories covers devices intended for use with a meter socket, such as jumper covers, meter socket extenders or other equipment.

Ratings of Listed meter socket accessories are limited to 600 VAC, 400 Amps maximum.

Meter socket accessories are only considered suitable for use in a meter socket with a short circuit current rating not exceeding 10,000 Amps, unless the accessory is otherwise marked.

For additional information see Meter Mounting Equipment (PJSR) and Meter Sockets (PJYZ).

The basic standard used to investigate products in this category is UL 414, "Meter Sockets".

The Listing Mark of Underwriters Laboratories Inc. on a product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED", control number and one of the following products members names as appropriate "Meter Socket Accessory", "Temporary Jumper Cover Accessory", "Meter Socket Extender", or other appropriate product name.

MINERAL INSULATED METAL-SHEATHED CABLE (PPKV)

GENERAL

This category covers Type MI mineral insulated metal-sheathed cable which consists of one or more solid copper conductors insulated with highly compressed magnesium oxide and enclosed in a continuous copper or alloy steel sheath, with or without a nonmetallic jacket. It is intended for use in accordance with Article 332 of NFPA 70, "National Electrical Code." Cable rated 600 V is labeled in sizes 16 AWG to 500 kcmil single conductor, 16 to 4 AWG two and three conductor, 16 to 6 AWG four conductor, and 16 to 10 AWG seven conductor constructions. Cable rated 300 V is labeled in two, three, four and seven conductor, sizes 18 to 16 AWG, for use on signaling circuits.

The copper sheath is suitable as an equipment grounding conductor. For cable with alloy steel outer sheath one of the conductors is to be used for equipment grounding.

Nonmetallic jackets or coatings have not been investigated for resistance to corrosion.

PRODUCT MARKINGS

Information regarding voltage rating, cable Type, and conductor size is shown either on a tag affixed to the reel or carton, or on the surface of the metal sheath. If a nonmetallic jacket is used, the information is printed on the surface of the jacket.

Cable with nonmetallic jackets has the following marking on a tag affixed to the reel or carton: "Not suitable for use in Ducts, Plenums or Other Spaces used for environmental air."

Cable with nonmetallic jackets marked "Not suitable for use on or in buildings" has not been investigated for fire retardance but are sunlight resistant.

Cable with nonmetallic jackets that has been investigated for use in cable trays is surface marked "CT Use" or "Cable Tray Use" and may additionally be marked "sunlight Resistant" if applicable.

RELATED PRODUCTS

Terminations especially investigated for use with this cable are covered under Mineral Insulated Cable Fittings (PPYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. affixed to the reel supporting the cable or tag attached to the cable is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Mineral Insulated Metal-Sheathed Cable."

MINERAL INSULATED CABLE FITTINGS (PPYT)

GENERAL

This category covers fittings for use on mineral insulated cable (Type MI) and small diameter mineral insulated cable. These fittings are suitable for use at a maximum operating temperature of 90°C in dry locations and 60°C in wet locations. A complete box connector consists of a connector body and a screw-on potting fitting.

Screw-on Potting Fitting — The screw-on potting fitting to be used with the connector may be used separately as an end fitting for change to open wiring. The screw-on potting fitting is to be assembled with a special tool and consists of a screw-on pot, insulating cap, insulating sleeving, anchoring bead, and sealing compound.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Mineral Insulated Metal-sheathed Cable (PPKV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Mineral Insulated Cable Fitting," "Connector," "Box Connector" or other appropriate product name as shown in the individual Listings.

MOTION PICTURE, TELEVISION STUDIO OR THEATER STAGE PORTABLE WIRING EQUIPMENT (PQWQ)

Motion picture, television studio or theater stage portable wiring equipment is rated 250 volts or less and is intended for portable wiring in motion picture or television studios in accordance with Article 530 of the National Electrical Code. Plugging boxes are also suitable for use in accordance with Article 520 in theater stages or motion picture and television studios incorporating assembly areas.

All units are intended for outdoor use unless marked "Indoor Use Only".

The listing includes cable splicing blocks (spiders) and stage type outdoor power distribution units (plugging boxes).

Partially enclosed, plastic framed cable splicing blocks (spiders) are suitable for outdoor use, damp locations. They are suitable to be exposed to rain or water spray when not energized. Following such an exposure they are intended to be dried and inspected prior to energization. They are intended for use by trained personnel in areas not readily accessible by the general public.

Bus bar clamps (sister lugs) are for use by trained personnel only. Cables terminating to bus bar clamps should be tied or otherwise supported so that flexing or strain on the conductors is not transmitted to the conductor termination at the bus bar clamp. Solder lug type units are not suitable to terminate an equipment grounding conductor. Bus bar clamps are marked with the range of intended wire sizes and the maximum current rating.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. For bus bar clamps the Listing Mark of Underwriters Laboratories Inc. is provided on the smallest unit container in which bus bar clamps are packaged and additionally, the UL symbol is provided on the bus bar clamp. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Stage Type Power Distribution Unit", "Cable Splicing Block", or "Bus Bar Clamp".

MOTOR GENERATOR SETS (PQYW)

USE

This category covers indoor use motor generator sets and frequency converters intended for use in ordinary locations in accordance with the National Electrical Code, NFPA 70.

RELATED PRODUCTS

This category does not cover electrical generating equipment driven by gasoline, LP-gas, or diesel fueled internal combustion engines. These products are covered under Engine Generators (FTSR).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508, "Electrical Industrial Control Equipment," UL 1004, "Electric Motors" and UL 1248, "Engine Generator Assemblies for Use in Recreational Vehicles."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-

tory) together with the word "LISTED," a control number, and the product name "Motor-Generator Set" or "Flywheel Energy Storage System" or other appropriate product name as shown in the individual Listings.

MOTORS (PRGY)

USE

This category covers motors intended for use in unclassified (ordinary) locations.

PRODUCT MARKINGS/INSTALLATION INSTRUCTIONS

An enclosed type motor has the enclosure type designation marked on the motor for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The motor may also be marked "Raintight" or "Rain-proof."

An enclosed type motor is not intended to be installed in an enclosure unless a marking on the motor, the installation instructions or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

An open type motor is intended to be installed in an enclosure suitable for the end use. The minimum size of the enclosure is marked on the motor, provided in the installation instructions or as a stuffer sheet provided with the motor.

A motor that has running heating and locked-rotor protection is marked "Thermally Protected" or if rated less than 1/8 hp (100 watts), "T.P." A motor that has locked-rotor protection only is marked "Thermally Protected L" or "Impedance Protected" or, if rated less than 1/8 hp (100 watts), "T.P.L." or "Z.P."

All motors are intended for use in a 40°C (104°F) ambient unless marked for a different ambient.

All motors are provided with installation information which indicate the proper methods to secure the motor and electrically connect the motor to the power source. The instructions will also provide information concerning the type of load the motor can operate and, if needed, what type of protection.

FIELD PROVISIONS

If a motor does not have thermal or impedance protection as described above, protection should be provided in the end-use application. The motor has a marking indicating that the motor is not provided with protection.

Motors are provided with a means to electrically connect the motor with the electrical system in the field.

Suitability of guards for the shaft or other moving parts should be determined in the end-use application.

RELATED PRODUCTS

Motors intended for use in hazardous (classified) locations are covered under Motors for Use in Hazardous Locations (PTDR), Motors, Specialty for Use in Hazardous Locations (PUCJ), or Motors, Division 2 for Use in Hazardous Locations (PTHE) in the Hazardous Locations Equipment Directory. Motors incomplete in construction and intended for ordinary use are covered under Motors (PRGY2) in the Recognized Component Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1004B, "Outline of Investigation for Electric Motors and Generators."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor."

MOUNTING POSTS AND PEDESTALS FOR DISTRIBUTION EQUIPMENT (PUPR)

This listing covers mounting posts and pedestals rated 600 v, ac or less. They are intended to serve as a raceway for underground wiring which is being brought to above the surface of the earth to feed an outdoor electrical distribution device such as a power outlet, panelboard, service equipment unit, meter socket or circuit breaker enclosure. They are intended to support the distribution unit which is installed either in the factory or in the field. They may contain electrical termination points for underground wiring and for wiring to the distribution unit.

A mounting post is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support. A mounting post is marked to indicate the proper ground level.

A mounting pedestal is intended to be mounted on a concrete slab.

A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities.

Unless marked otherwise, a mounting post or pedestal is intended to be self-supporting and is not intended to serve as the support of a mast for overhead wiring.

Mounting posts and pedestals are marked to indicate the electrical distribution unit(s) with which they are intended to be used.

Investigation of posts and pedestals include a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water. Posts and pedestals as Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the equipment is marked with both the size and temperature rating of wire to be used, the termination provisions on equipment are based on the use of 60 C wire ampacities for wire sizes, Nos. 14-1 Awg, and 75 C wire ampacities for wire sizes, No. 1/0 Awg and larger.

The basic standard used to investigate products in this category is UL 1773, "Termination Boxes".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mounting Post and Pedestal".

MULTIOUTLET ASSEMBLIES (PVGT)

USE AND INSTALLATION

This category covers metal raceways with factory-installed conductors and attachment plug receptacles without provision for field installation of additional conductors except where the product is marked to indicate the number, type and size of additional conductors which may be field installed. Also covered are nonmetallic raceways with factory-installed conductors and attachment plug receptacles either factory installed or separately Listed as Multioutlet Assembly Fittings (PVUR) for field installation.

Separation of communication, signal and data circuits from branch circuit wiring is provided in the assembly where the conductors are installed at the factory. Separate channels are provided in assemblies intended to be field wired with circuits requiring separation.

Multioutlet assemblies are for installation in accordance with Article 380 of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 5, "Surface Metal Raceways and Fittings" and UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-Outlet Assembly."

MULTIOUTLET ASSEMBLY FITTINGS (PVUR)

Multi-outlet assembly fittings, consisting of flexible metal conduit or armored cable to be connected to multioutlet assemblies by means of a nonstandard wired plug-in fitting at one end and to electric fixtures at the other end, are suitable for use in air handling plenums when marked to indicate this use.

The basic standards used to investigate products in this category are UL5, "Surface Metal Raceways and Fitting", and UL5A, "Nonmetallic Surface Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Multi-Outlet Assembly Fitting", "Elbow", "End Fitting", or other appropriate product name.

NEON TRANSFORMERS AND POWER SUPPLIES (PWIK)

USE

This category covers indoor and outdoor use neon transformers and power supplies for use with display signs, outline lighting and luminaires employing gas-filled glass tubing identified as neon or electric discharge tubing.

These transformers and power supplies have been evaluated for the secondary-circuit ground fault protection requirements in NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

Transformers and power supplies covered under this category are marked "Indoors," "Outdoors," or "Weatherproof" or "WP." Products marked "Indoors" are only suitable for use indoors, and products marked "Outdoors" are suitable for use indoors or outdoors sheltered from rain, snow and the like by being located within a sign body, enclosure and the like. Products marked "Weatherproof" or "WP" do not need to be additionally sheltered from rain, snow and the like.

Transformers and power supplies covered under this category are marked with a Type number from 2 to 8 in association with the location designation "Indoors," "Outdoors," "Weatherproof" or "WP." These Type numbers identify particular construction features associated with a particular transformer or power supply as identified below:

Type 2 – Neon supply with input and output terminals or leads that should be enclosed in accordance with the NEC.

Type 3 – Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system, and with output terminals or leads that should be enclosed in accordance with the NEC.

Type 4 – Neon supply with input and output terminals or leads enclosed and intended for connection to a permanent wiring system.

Type 5 – Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system and provided with integral receptacles for output connection.

Type 6 – Cord-connected neon supply provided with integral receptacles for output connection.

Type 7 – Cord-connected neon supply with output terminals or leads that should be enclosed in accordance with the NEC.

Type 8 – Cord-connected neon supply with enclosed output terminals or leads.

These Type designations do not relate in any way to general enclosure designations as noted in Electrical Equipment for Use in Ordinary Locations (AALZ).

Transformers and power supplies are also marked with a model designation and may be marked with an optional designation 2161HX, 2161KX, 2161MH or 2161WX. The optional designations provide information on the construction of the transformer and power supply for sign manufacturers and installers to use for ordering and replacement purposes.

Transformers and power supplies marked "For Moving Vehicle Use Only" are intended for use only in moving vehicles and not for use in a freestanding sign, or building-mounted sign or outline lighting product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2161, "Neon Transformers and Power Supplies."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up-Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Neon Transformer" or "Neon Power Supply."

NETWORK POWERED BROADBAND COMMUNICATIONS CABLE (PWIP)

USE

This category covers network powered broadband communications cable which is a jacketed single conductor coaxial cable, or a multiple-conductor jacketed cable consisting of a combination of coaxial members, insulated conductors and/or optic fiber members. The cable is intended for use in low power and medium power circuits in accordance with Article 830 of NFPA 70, "National Electrical Code" (NEC). All types with the exception of Type BLP are suitable for installation outdoors on dwellings.

PRODUCT MARKINGS

Network powered broadband communications cable is identified by markings on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

BMU — Indicates medium power cable intended for outdoor underground use in accordance with Section 830.54(C) of the NEC. This cable complies with the Cable Flame Test requirements in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

BM — Indicates medium power cable intended for general use within buildings in accordance with Section 830.54(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test described in UL 1581, or as an alternative, the damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test also described in UL 1581.

BMR — Indicates medium power cable intended for use within buildings in vertical shafts in accordance with Section 830.54(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

BLU — Indicates low power cable intended for outdoor underground use in accordance with Section 830.55(D)(3) of the NEC. This cable complies with the Cable Flame Test requirements in UL 1581.

BLX — Indicates cable intended for limited use within buildings (1) where the cables are enclosed in raceway or noncombustible tubing, or (2) installed in one- or two-family or multifamily dwellings when the cable diameter is less than 0.375 in. in accordance with Sections 830.55(C)(2) and (3) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

BLP — Indicates cable intended for use only within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 830.55(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-propagation distance of 5 ft, when tested in accordance with NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

Cable that contains one or more optical-fiber members has the suffix "OP" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable that has been investigated for use where exposed to the direct rays of the sun is surface marked "Sunlight Resistant" or "Sun Res."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Network Powered Broadband Communications Cable."

NONMETALLIC-SHEATHED CABLE (PWVX)

USE

This category covers Types NM-B and NMC-B nonmetallic-sheathed cable, rated 600 V, intended for use in accordance with Article 334 of NFPA 70, "National Electrical Code" (NEC), and Listed in copper sizes 14 to 2 AWG inclusive and aluminum or copper-clad aluminum sizes 12 to 2 AWG inclusive.

This cable contains conductors rated 90°C; however, the ampacities of the cable are those of 60°C conductors as specified in Article 334 and Table 310.16 of the NEC.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surface marked "AL (CU-CLAD)" or "Cu-clad Al," and cable with aluminum conductors is surface marked "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays is appropriately marked. Cable marked for cable tray use may also have a supplementary sunlight resistant marking.

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "LS."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 719, "Nonmetallic-Sheathed Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Nonmetallic-sheathed cable that contains copper or copper-clad aluminum conductors has the product name "Nonmetallic-sheathed Cable"; nonmetallic-sheathed cable that contains aluminum conductors has the product name "Nonmetallic-sheathed Aluminum Cable."

NONMETALLIC-SHEATHED CABLE CONNECTORS (PXJV)

GENERAL

Connectors for use with nonmetallic-sheathed cable are also suitable for use with multi-conductor underground feeder and branch circuit cable where used in dry locations unless otherwise indicated on the carton.

Single Cable — If single conductor Type UF cable is terminated with a fitting not specifically recognized for use with single conductor cable, special care should be taken to assure it is properly secured and not subject to change.

RELATED PRODUCTS

Connectors covered under Armored Cable Connectors (AWSX), Conduit Fittings (DWTT) and Power and Control Tray Cable Connectors (QPOZ) are also suitable for use with nonmetallic-sheathed cable when specifically indicated on the device or carton.

Connectors suitable for flexible cord only are covered under Outlet Bushings and Fittings (QCRV).

MARKINGS

Connectors which are also suitable for use with service entrance cable, flexible nonmetallic tubing, or flexible cord are so indicated on the device or carton.

Except for duplex connectors or when otherwise marked on the carton to indicate connecting of more than one cable or cord, the connectors covered under this category have been investigated for connecting one cable or cord only.

ADDITIONAL INFORMATION

For additional information, see Nonmetallic-sheathed Cable (PWVX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Sheathed Cable Connector," or "N.M. Cable Connector" or other appropriate product name as shown in the individual Listings.

NONMETALLIC EXTENSIONS (PXXT)

NONMETALLIC EXTENSION FITTINGS (PYYZ)

This Listing covers attachment plug caps, receptacles for attachment plugs, and end caps for nonmetallic surface extensions, and wiring compartments, entrance bushings, bonding connectors, hangers, terminal fittings, support fittings, receptacles and lampholders for aerial cable.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the

following product names as appropriate: "Nonmetallic Extension Fitting", "NM Extension Ftg.", "End Cap", or other appropriate product name.

NONMETALLIC SURFACE EXTENSIONS (PZMX)

This Listing covers assemblies of two insulated circuit conductors with or without a grounding conductor within a nonmetallic jacket or extruded thermoplastic covering and intended for installation in accordance with Article 342 of the National Electrical Code. Assemblies without a grounding conductor are marked "Intended for replacement use only."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Surface Extension".

NONMETALLIC-SHEATHED CABLE INTERCONNECTORS (QAAV)

GENERAL

This category covers self-contained interconnectors employing pressure cable connectors, insulation displacement or insulation piercing connectors for splicing or tapping nonmetallic (NM) sheathed cable. These interconnectors are intended for installation in accordance with Section 336.21 and Articles 545, 550 and 551 of NFPA 70, "National Electrical Code."

These devices have been evaluated for equivalency to Type NM cable in insulation and temperature rise, and for capability to withstand fault currents, vibration and mechanical shock that may occur during transport of the units in which they are used.

PRODUCT MARKINGS

The devices are marked with the Listee's name or identification, the catalog number or equivalent, and complete electrical ratings.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2256, "Outline of Investigation for Nonmetallic Sheathed Cable Interconnectors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Sheathed Cable Interconnector" or "N.M. Cable Interconnector" or other appropriate product name as shown in the individual Listings.

OPTICAL FIBER CABLE (QAYK)

USE AND INSTALLATION

This category covers optical fiber cable which is a jacketed cable for use within buildings in accordance with Article 770 of NFPA 70, "National Electrical Code" (NEC). Where optical fiber is installed in a laser system, the system shall comply with the ANSI Z136 laser system safety standards.

PRODUCT MARKINGS

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

OFC — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in accordance with Section 770.53(C) of the NEC. This cable does not spread fire to the top of the tray when tested as described under UL Flame Exposure (smoke measurements are not applicable) in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

OFN — This cable is the same as Type OFC except it contains no metallic members and no other electrical conductive materials.

OFNG — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in accordance with Section 770.53(C) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested as described under "FT4/IEEE 1202 Type of Flame Exposure" (smoke measurements are not applicable) in UL 1685.

OFNG — This cable is the same as Type OFCG except it contains no metallic members and no other electrically conductive materials.

OFCR — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in vertical runs in a shaft in accordance with Section 770.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

OFNR — This cable is the same as Type OFCR except it contains no metallic members and no other electrically conductive materials.

OFCP — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

OFNP — This cable is the same as Type OFCP except it contains no metallic members and no other electrically conductive materials.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1651, "Optical Fiber Cable."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Cable."

Cable also verified to a performance specification under Optical Fiber Cable Verified in Accordance with National or International Specifications (QAZI) has the marking "Also Verified [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

OPTICAL FIBER CABLE, FIELD ASSEMBLED (QAZD)

USE AND INSTALLATION

This category covers field-assembled optical fiber cable which is an on-site assembly of one or more optical fiber units and an optical fiber jacket. Field-assembled optical fiber cable is intended for installation in buildings in accordance with Article 770 of NFPA 70, "National Electrical Code" (NEC). The optical fiber jacket is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fiber units are inserted into the jacket, completing the assembly.

Listed field-assembled optical fiber cable is for use with Class I laser products, in accordance with applicable provisions of 21CFR Part 1040, or with light emitting diodes with power levels that do not exceed the limits for Class I lasers.

PRODUCT MARKINGS

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the Type designations below and the Listee's name and catalog designation.

OFN — Indicates cable containing only optical fiber units for use in accordance with Section 770.53(C) of the NEC. This cable does not spread fire to the top of the tray during the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

OFNP — Indicates cable containing only optical fiber units, for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance, when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

OFNR — Indicates cable containing only optical fiber units, for use in vertical runs in a shaft in accordance with Section 770.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged includes the following: "For Use Only with Optical Fiber Units, Cat. No.____, manufactured by [company name]."

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber units are packaged includes the following: "[Company name] Optical Fiber Unit, For Use Only With Optical Fiber Jacket Cat. No. ____ , manufactured by [company name]."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1651, "Optical Fiber Cable."

UL MARK

The UL symbol on the optical fiber jacket and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Field Assembled Optical Fiber Cable."

OPTICAL FIBER CABLE (QAZG)

OPTICAL FIBER CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (QAZI)

GENERAL

This category covers data transmission optical fiber cable whose signal transmission, environmental and/or mechanical performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with a published specification. This cable is not necessarily evaluated for use in accordance with the specifications of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol with the word "VERIFIED" on the product and the Verification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Fiber Cable" and the Specification name and/or number.

For optical fiber cables which are also Listed under Optical Fiber Cable (QAYK), the marking includes the appropriate Listing Mark and the text "Also Verified [Specification name and/or number]."

OPTICAL FIBER CABLE VERIFIED IN ACCORDANCE WITH NEW YORK CITY TRANSIT SPECIFICATION TO (QAZK)

GENERAL

This category covers data transmission optical fiber cable whose signal transmission, environmental and/or mechanical performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with New York City Transit Specification TO. This cable is not necessarily evaluated for use in accordance with the specifications of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol with the word "VERIFIED" on the product and the Verification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, and the product name "Optical Fiber Cable NYC Transit Specification TO."

For optical fiber cable which is also Listed under Optical Fiber Cable (QAYK), the marking includes the appropriate Listing Mark along with

either the Verification Mark and "NYC Transit Specification TO" or the text "Also Verified to NYC Transit Specification TO."

OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAYS (QAZM)

USE AND INSTALLATION

This category covers raceways and fittings for installation of nonconductive optical fiber cable in accordance with Article 770 of NFPA 70, "National Electrical Code" (NEC) and communications cable in accordance with Article 800 of the NEC. The raceways are only suitable for the installation of the optical fiber and communications cable noted in the following information. Individual raceway systems differ in their construction and, therefore, their components are not interchangeable with other raceways or fittings of other systems. This category includes pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings.

A raceway marked "Plenum" is suitable for use in ducts, plenums or other spaces used for environmental air in accordance with Sections 770.53(A) and 800.53(A) of the NEC when used to enclose optical fiber cables marked OFNP or communications cable marked "CMP" or "CMP-OF." This raceway exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested in accordance with the Test for Flame Propagation and Smoke-Density Values (Plenum) in UL 2042, "Optical Fiber Cable Raceway." This raceway is identified by a marking on the surface of the raceway or on a marker tape indicating "Plenum." A raceway marked "Plenum" is also suitable for installation in risers when used to enclose optical fiber cable marked "OFNP" or "OFNR," or communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF" and general purpose use when used to enclose optical fiber cable marked "OFNP," "OFNR," "OFNG" or "OFN" or communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" or "CM-OF."

A raceway marked "Riser" is suitable for installation in risers in accordance with Sections 770.53(B) and 800.53(B) of the NEC when used to enclose optical fiber cable marked "OFNP" and "OFNR" or communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF." This raceway has fire resistant characteristics capable of preventing the carrying of fire from floor to floor. This raceway meets the test requirements of the Test for Flame Propagation (Riser) in UL 2042. This raceway is identified by a marking on the surface of the raceway or on a marker tape indicating "Riser." A raceway marked "Riser" is also suitable for general purpose use when used to enclose optical fiber cable marked "OFNP," "OFNR," "OFNG" or "OFN" or communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" and "CM-OF."

A raceway with neither the marking "Plenum" nor "Riser" is suitable for general purpose use, with the exception of risers, plenums, and other spaces used for environmental air when used to enclose optical fiber cable marked "OFNP," "OFNR" or "OFN" or communications cable marked "CMG," "CMG-OF," "CM," "CM-OF," "CMR," "CMR-OF," "CMP" or "CMP-OF." This raceway is resistant to the spread of fire when tested in accordance with the Vertical-Tray Flame Test (General Use) in UL 2042.

Pliable raceway is a raceway that can be bent by hand without the use of tools. The smallest radius of the curve of the inner edge of any bend to which the raceway may be bent without cracking either on the outer surface or internally is not less than 2-1/2 times the outside diameter of the raceway.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2042, "Optical Fiber Cable Raceway."

UL MARK

The UL symbol and the product name "Optical Fiber Raceway," "Communications Cable Raceway" or "Optical Fiber/Communications Cable Raceway" on the raceway, and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Optical Fiber Raceway," "Communications Cable Raceway" or "Optical Fiber/Communications Cable Raceway."

OPTICAL FIBER RACEWAY ASSEMBLIES (QAZQ)

GENERAL

This category covers raceway assemblies intended for installation of optical fiber cable in accordance with Article 770 of NFPA 70, "National

Electrical Code." The raceway may be provided with multiple inner ducts that are assembled before shipment. Raceway systems differ in their inside and outside diameters and, therefore, are not interchangeable with other conduit or raceway systems. This category includes straight sections, elbows, bends, and fittings intended to be secured together by cement.

The raceway assemblies are designed for use under the following conditions, as indicated in the Listing Mark: (1) direct burial with or without being encased in concrete, (2) aboveground, or both (1) and (2).

The transition from an optical fiber raceway system to another conduit or raceway system has not been investigated.

The raceway system components have not been evaluated for their ability to withstand exposure to reagents, unless specifically marked.

Aboveground raceway assemblies are suitable for exposed work where not subjected to physical damage and where expansion fittings are not necessary.

ADDITIONAL INFORMATION

For additional information, see Optical Fiber/Communications Cable Raceways (QAZM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark of these products includes the UL symbol (as illustrated in the Introduction of this directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Optical Fiber Raceway Assemblies, Underground," "Optical Fiber Raceway Assemblies, Underground for Concrete Encasement Only," "Optical Fiber Raceway Assemblies, Underground Direct Burial and Concrete Encasement" or "Optical Fiber Raceway Assemblies, Aboveground, Underground Direct Burial and Concrete Encasement."

OPTICAL FIBER RACEWAY PULLTAPE CLASSIFIED FOR FLAME AND SMOKE CHARACTERISTICS (QAZT)

GENERAL

This category covers pulltape for use in optical fiber raceways (OFR) that are to be installed in air handling spaces or plenums.

These products exhibit peak optical densities of 0.5 or less, maximum average optical densities of 0.15 or less and maximum flame propagation distances of 5 ft or less when tested in accordance with UL 910.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 910, "Tests for Fire-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces for Environmental Air."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

UNDERWRITERS LABORATORIES INC. ®

CLASSIFIED

OFR PULLTAPE

FOR FLAME AND SMOKE ONLY

OPTICAL FIBER/COMMUNICATIONS CABLE ROUTING ASSEMBLIES FOR USE IN TELECOMMUNICATION INSTALLATIONS (QBAA)

USE AND INSTALLATION

This category covers routing assemblies for installation of nonconductive optical fiber cable and communications cable. The routing assemblies are only suitable for the installation of optical fiber and communications cable noted in the following information. Individual routing assembly systems differ in their construction and, therefore, their components are not interchangeable with other routing assemblies or fittings of other systems. This category includes pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings.

These products are intended for installation in telecommunications facilities. These products may or may not incorporate end fixtures or covers.

Optical fiber and communications cable raceways are Listed in accordance with Sections 770.53(A) and 800.53(A) of NFPA 70, "National Electrical Code" under Optical Fiber/Communications Cable Raceways (QAZM).

A routing assembly marked "Plenum" is suitable for use in ducts, plenums or other spaces used for environmental air when used to enclose

optical fiber cable marked "OFNP" or communications cable marked "CMP" or "CMP-OF." This routing assembly exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested in accordance with Subject 2024A, "Outline of Investigation for Optical Fiber Cable Routing Assemblies." This routing assembly is identified by a marking on the surface of the routing assembly or on a marker tape indicating "Plenum." A routing assembly marked "Plenum" is also suitable for installation in risers when used to enclose optical fiber cable marked "OFNP" or "OFNR," or communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF," and general purpose use when used to enclose optical fiber cable marked "OFNP," "OFNR," "OFNG" or "OFN," or communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" or "CM-OF."

A routing assembly marked "Riser" is suitable for installation in riser installations when used to enclose optical fiber cable marked "OFNP" or "OFNR," or communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF." This routing assembly has fire resistant characteristics capable of preventing the carrying of fire from floor to floor. This routing assembly meets the test requirements of Subject 2024A. This routing assembly is identified by a marking on the surface of the routing assembly or on a marker tape indicating "Riser." A routing assembly marked "Riser" is also suitable for general purpose use when used to enclose optical fiber cable marked "OFNP," "OFNR," "OFNG" or "OFN," or communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" and "CM-OF."

A routing assembly with neither the marking "Plenum" nor "Riser" is suitable for general purpose use, with the exception of risers, plenums, and other spaces used for environmental air when used to enclose optical fiber cable marked "OFNP," "OFNR" or "OFN," or communications cable marked "CMG," "CMG-OF," "CM," "CM-OF," "CMR," "CMR-OF," "CMP" or "CMP-OF." This routing assembly is resistant to the spread of fire when tested in accordance with the Vertical-Tray Flame Test (General Use) in Subject 2024A.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2024A, "Outline of Investigation for Optical Fiber Cable Routing Assemblies."

UL MARK

The UL symbol on the product or the complete Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Routing Assembly," "Communications Cable Routing Assembly" or "Optical Fiber/Communications Cable Routing Assembly."

OPTICAL FIBER BRANCHING DEVICES (QBEA)

GENERAL

This category covers optical fiber branching devices. These devices are intended for residential and/or commercial applications as part of an optical fiber wiring system.

Optical fiber branching devices include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 746C, "Polymeric Materials – Use in Electrical Equipment Evaluations." Additionally, branching devices employing optical fiber connectors have been evaluated to EIA/TIA Standard FOTP-6, "Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Branching Device."

For optical fiber branching devices which are also Verified to a performance specification under Optical Fiber Branching Devices Verified in

Accordance with National or International Specifications (QBEN), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]" or the UL Verification Mark along with [Specification name and/or number].

OPTICAL FIBER BRANCHING DEVICES VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (QBEN)

GENERAL

This category covers optical fiber branching devices whose signal transmission, environmental and/or mechanical performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with a published specification.

Optical fiber branching devices include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices. These devices are intended for residential and/or commercial applications as part of an optical fiber wiring system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Verification Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Fiber Branching Device" and the Specification name and/or number.

For optical fiber branching devices which are also Listed under Optical Fiber Branching Devices (QBEA), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]" or the UL Verification Mark along with [Specification name and/or number].

OPTICAL FIBER CABLE ASSEMBLIES AND CONNECTORS (QBFA)

GENERAL

This category covers factory assembled optical fiber cable assemblies and connector products. They are intended for residential and/or commercial applications as part of an optical fiber wiring system.

Optical fiber cable assemblies consist of Listed optical fiber cable and optical fiber cable connectors and are intended for use in accordance with Article 770 of NFPA 70, "National Electrical Code" (NEC). According to Article 770, the restrictions that apply to the cable used in these assemblies also apply to the complete cable assemblies.

These assemblies have not been evaluated for use in environmental air spaces, in accordance with Sections 300.22(B) and (C) of the NEC unless specifically marked for the application.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate optical fiber connectors is UL 746C, "Polymeric Materials – Use in Electrical Equipment Evaluations." The basic standards used to investigate optical fiber cable assemblies are UL 746C and EIA/TIA Standard FOTP-6, "Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Cable Assembly" or "Optical Fiber Connector."

For optical fiber cable assemblies and optical fiber connectors which are also Verified to a performance specification under Optical Fiber Cable Assemblies and Connectors Verified in Accordance with National or Inter-

national Specifications (QBFN), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]" or the UL Verification Mark along with [Specification name and/or number].

OPTICAL FIBER CABLE ASSEMBLIES AND CONNECTORS VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (QBFN)

GENERAL

This category covers optical fiber cable assemblies and connector products whose signal transmission, environmental and/or mechanical performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with a published specification.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Verification Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Cable Assembly" or "Optical Fiber Connector" and the Specification name and/or number.

For optical fiber cable assemblies and optical fiber connectors which are also Listed under Optical Fiber Cable Assemblies and Connectors (QBFA), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]" or the UL Verification Mark along with [Specification name and/or number].

OUTLET BOXES AND FITTINGS (QBPZ)

OUTLET BOXES AND FITTINGS CLASSIFIED FOR FIRE RESISTANCE (QBWY)

GENERAL

This category covers special purpose boxes for installation in floors and nonmetallic outlet boxes for installation in walls and partitions and ceilings in accordance with the provisions of NFPA 70, "National Electrical Code" (NEC). They have shown a degree of fire resistance when installed in the particular floor(s) or wall(s) described for each Classified company. Boxes of the type Listed in UL's Electrical Construction Materials Directory have been investigated and found to comply with established electrical requirements and are so Listed.

This category includes Classifications for nonmetallic outlet and switch boxes for use in fire resistive rated wall or partition assemblies. The information provided for each Classification includes the model numbers for the Classified products, a description of the rated assemblies, the spacing limitations for the boxes and the installation details. Nonmetallic boxes should not be installed on opposite sides of walls or partitions of staggered stud construction unless Classified for use in such constructions.

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Such products may be installed in air-handling spaces in accordance with Sec. 300.22(C) of the NEC. Authorities Having Jurisdiction should be consulted before installation.

FLOOR BOXES

Boxes for use with floors have been investigated for use with electrical receptacles fabricated of melamine, phenolic or urea materials, unless specified otherwise in the installation instructions and Classification information. Floor boxes and fittings are intended to be installed in accordance with installation instructions provided with the product.

Boxes with integral connectors for electric metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the box has been tested.

Floor boxes designated for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Those boxes, intended for installation in concrete floors, are frequently provided with leveling screws, threaded hubs, or both and are provided with a marking on the carton to identify boxes of this type such as "Floor Box" or "Floor Box, Concrete Tight" as appropriate.

WALL AND PARTITION AND CEILING BOXES

Nonmetallic outlet boxes evaluated for installation in fire resistive assemblies are provided with the appropriate Listing Mark for electrical products and other markings as described in Nonmetallic Outlet Boxes (QCMZ). Nonmetallic outlet boxes Classified for use in fire resistive designs may have the following marking in the base of the box:



Class * hr, F, W and/or C

where * indicates hourly rating such as 1 hr or 2 hr and F = Floor, W = Wall and C = Ceiling.

The boxes are Classified for use in certain fire resistive designs when installed in accordance with the details described for each Classified company. Any Listed metallic or nonmetallic cover is suitable for use with these nonmetallic boxes.

For information on the installation of Listed metallic outlet and switch boxes in fire resistive rated wall or partition assemblies, see Metallic Outlet Boxes (QCIT).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or on each UL Classified Steel Floor and Form Unit with factory-installed floor boxes or the UL symbol on the product and the Classification Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

OUTLET BOXES AND FITTINGS
CLASSIFIED FOR FIRE RESISTANCE
DESIGN NOS. _____
SEE PRODUCT CATEGORY IN
UL FIRE RESISTANCE DIRECTORY
(Control No.)

Where indicated in the individual Classifications, products may be marked "Suitable for use in air-handling spaces in accordance with Sec. 300.22(C) of the National Electrical Code" when investigated to determine suitability for such use.

METALLIC OUTLET BOXES (QCIT)

GENERAL

This category covers metallic flush device boxes, conduit bodies, conduit boxes, outlet boxes, special purpose boxes, extension rings, covers, and flush-device cover plates.

BOX EXTENSIONS

Box extensions are suitable for extending properly secured flush or surface mounted boxes. One or more extensions may be used.

USE IN FIRE RATED ASSEMBLIES

Listed single and double gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing wood stud and steel stud walls with rating not exceeding 2 h. These walls have gypsum wallboard facings similar to those shown in Design Nos. U301, U411 and U425, as shown in UL's Fire Resistance Directory. The boxes are intended to be fastened to the studs with the openings in the wallboard facing cut so that the clearance between the boxes and the wallboard do not exceed 1/8 in. The boxes are intended to be installed so that the surface area of individual boxes do not exceed 16 sq in, and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of wall surface.

Boxes located on opposite sides of walls or partitions are intended to be separated by a minimum horizontal distance of 24 in. This minimum separation distance between the boxes may be reduced when Wall Opening Protective Materials (QCSN) are installed according to the requirements of their Classification.

The boxes are not intended to be installed on opposite sides of walls or partitions of staggered stud construction unless Wall Opening Protective Materials (QCSN) are installed with the boxes in accordance with Classification requirements for the protective materials.

Listed metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in floor-ceiling and roof-ceiling assemblies with ratings not exceeding 2 h when these assemblies have gypsum wallboard membranes. The boxes are intended to be fastened to the joists with the openings in the wallboard facing cut so that the clearance between the boxes and the gypsum wallboard do not exceed 1/8 in. The boxes are intended to be installed so that the surface area of individual boxes do not exceed 16 sq in and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of ceiling surface.

CONDUIT BODIES

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are covered under Conduit Fittings (DWTT). Conduit bodies Classified for use with specific conduit body covers and conduit body covers Classified for use with specific conduit bodies are covered under Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW).

CONCENTRIC OR ECCENTRIC KNOCKOUTS

All boxes with concentric or eccentric knockouts have been investigated for bonding and are suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250 V, and may be marked as such.

CLAMPS

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with armored cable: "A," flexible metal conduit "F," nonmetallic sheathed cable "N" or flexible tubing (loom) "T." Clamps that are suitable for type MC metal clad cable are marked "MCI" for metal clad interlocking armored cables, "MCS" for metal clad continuous smooth sheath cable, and "MCC" for metal clad continuous corrugated sheath cable. If suitable for all seven types, the clamp is marked "ALL." Clamps suitable for nonmetallic sheathed cable are also suitable for multi-conductor underground feeder and branch circuit cable where used in dry locations.

Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout.

GROUNDING

Clamps for armored cable, flexible metal conduit, metal clad continuous smooth sheath cable, or metal clad continuous corrugated sheath cable are considered suitable for grounding where installed in accordance with NFPA 70, "National Electrical Code" (NEC).

FIXTURE SUPPORT

A box, with or without bracket or bar hanger, intended for support of a fixture weighing 50 lbs or less, is provided with a marking "FOR FIXTURE SUPPORT" on the carton to indicate that the box is for fixture support. A box, with or without bracket or bar hanger, intended for support of a fixture weighing more than 50 lbs, is marked with the weight of the fixture to be supported. Metallic device boxes and device plaster rings have not been investigated for support of a ceiling fixture unless marked to indicate such use. Metallic device boxes or metallic device boxes intended to be installed in an existing structure have been investigated for the support of fixtures, smoke detectors and carbon monoxide detectors weighing not more than 6 lbs.

INTEGRAL CONNECTORS

Boxes with integral connectors for electrical metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the boxes have been tested.

CEILING SUSPENDED FAN SUPPORT

A box, a box with bracket, or bar hanger intended for support of a ceiling suspended (paddle) fan weighing 35 lbs or less is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT." A box, a box with bracket, or bar hanger for support of a ceiling suspended (paddle) fan weighing more than 35 lbs but not more than 70 lbs is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT up to 70 lbs."

CONCRETE TIGHT

All metal boxes, except aluminum alloy boxes, are provided with corrosion protection suitable for installation in concrete. Aluminum alloy boxes listed here are not considered acceptable for installation in concrete or cinder fill unless protected by asphalt paint or the equivalent. Boxes designated as "concrete tight" may have no means of support other than the concrete and often accommodate covers at top and bottom.

FLOOR BOXES

Floor boxes designed for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs or both, and are provided with a marking on the carton to identify boxes of this type such as "Floor Box Cover," "Floor Box" or "Floor Box, Concrete Tight" as appropriate.

WET AND DAMP LOCATIONS

Boxes and covers intended for use in wet locations as defined by the NEC are marked "Wet Location." Damp location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked "Damp Location." Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit.

Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked "Wet Location Only When Cover Closed" and may be marked "Damp Location."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 514A, "Metallic Outlet Boxes" and UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

UL MARK

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Outlet Box," "Outlet Box and Cover," "Extension Ring," "Flush Device Box," or other appropriate product name as shown in the individual Listings.

Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW)

This category covers Listed conduit body covers Classified for use with specified Listed conduit bodies, and Listed Conduit Bodies Classified for use with specified Listed Conduit Body Covers, in accordance with the details described in the Classification Marking.

These products have been evaluated for use in wet locations.

The basic standard used to investigate products in this category is UL 514A, "Metallic Outlet Boxes".

Products Classified under this category are also Listed under the category "Metallic Outlet Boxes".

The Classification Marking of Underwriters Laboratories Inc. on the product or smallest unit container in which the product is packaged, when size or shape permits, is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the complete Listing Mark for Metallic Outlet Boxes (QCIT) and the statement: "Also Classified by Underwriters Laboratories Inc. For Use With UL Listed (Conduit Body) (Conduit Body Cover), Catalog No. _____, (Listees name).

NONMETALLIC OUTLET BOXES (QCMZ)

GENERAL

This category covers nonmetallic flush device boxes, conduit bodies, conduit boxes, outlet boxes, special purpose boxes, extension rings, covers, and flush device cover plates.

CONDUIT BODIES

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are Listed under the product category Conduit Fittings (DWTT). Conduit bodies Classified for use with specific conduit body covers and conduit body covers Classified for use with specific conduit bodies are covered under Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW).

CLAMPS

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with nonmetallic sheathed cable "N" or flexible tubing (loom) "T." Clamps suitable for nonmetallic sheathed cable are also suitable for multi-conductor underground feeder and branch circuit cable where used in dry locations unless the box or smallest unit carton is

marked "Nonmetallic Sheathed Cable Only." Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout.

Boxes intended for use with nonmetallic sheathed cable or open wiring are suitable for use with cable or wire rated 90°C or less, unless marked for a higher rated wire in degrees centigrade.

SINGLE-GANG BOX

A box nominally 2-1/4 by 4 in. or smaller is intended for one or more nonmetallic sheathed cables to enter through a single or multiple stage knockout opening.

FOR USE WITH RIGID NONMETALLIC CONDUIT

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are provided with a marking on the carton to indicate the intended use, such as "For [Specific Type] Conduit." Such boxes, when so marked on the box or carton and provided with installation instructions, are intended for support by the specified conduit. Such boxes are inherently resistant to atmosphere containing common industrial corrosive agents and will withstand vapors or mists of caustic pickling acids, plating baths, and hydrofluoric and chromic acids. Nonmetallic boxes for use with rigid PVC conduit are suitable for use with wire rated 90°C or less.

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are not intended to support equipment or to accommodate heat producing equipment.

FIXTURE SUPPORT

A nonmetallic box, with or without bracket or bar hanger, intended for support of a fixture weighing 50 lbs or less, is provided with a marking "FOR FIXTURE SUPPORT" on the carton. A nonmetallic box, with or without bracket or bar hanger, intended for support of a fixture weighing more than 50 lbs. is marked with the weight of the fixture to be supported. Nonmetallic boxes and device plaster rings have not been investigated for support of a ceiling fixture unless marked to indicate such use. Nonmetallic device boxes or nonmetallic device boxes intended to be installed in an existing structure have been investigated for the support of fixtures, smoke detectors and carbon monoxide detectors weighing not more than 6 lbs.

CEILING SUSPENDED FAN SUPPORT

A box, a box with bracket or bar hanger intended for support of a ceiling suspended (paddle) fan is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT." A box, a box with bracket or bar hanger intended for support of a ceiling suspended (paddle) fan weighing more than 35 lbs. but not more than 70 lbs. is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT up to 70 lbs."

CONCRETE TIGHT

Boxes designated as "concrete tight" may have no means of support other than the concrete and often accommodate covers at top and bottom.

FLOOR BOXES

Floor boxes designed for floor installation as covered in NFPA 70, "National Electrical Code" (NEC) are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs, or both and are provided with a marking on the carton to identify boxes of this type such as, "Floor Box Cover" or "Floor Box, Concrete Tight" as appropriate.

WET AND DAMP LOCATIONS

Boxes and covers intended for use in wet locations as defined by the NEC are marked "Wet Location." Damp location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked "Damp Location." Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit.

Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked "Wet Location Only When Cover Closed" and may be marked "Damp Location."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 514C, "Nonmetallic Outlet Boxes, Flush Device Boxes, and Covers" and UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

UL MARK

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as

appropriate: "Outlet Box," "Outlet Box and Cover," "Extension Ring," "Flush Device Box," or other appropriate product name as shown in the individual Listings.

OUTLET BUSHINGS AND FITTINGS (QCRV)

GENERAL

This category covers supports for outlet and flush device boxes; fittings for use in or on outlet and flush device boxes, such as knockout reducers, seals and insulating inserts, and cord grip attachments; service entrance heads for rigid conduit or electrical metallic tubing; cable riser supports; and bushings for use on the ends of rigid or flexible conduit, or electrical metallic tubing, where a change to open wiring is made.

Armored Cable Bushings — These bushings are used on armored cable between the conductors and the outer armor. They are a readily distinguishable bright color such as red, orange or yellow.

Bushings — These bushings are suitable for temperatures of 150°C if they are black or brown in color, 90°C if they are any other color unless specifically marked for a higher temperature. Other bushings are covered under Insulating Bushings (NZMT) and Conduit Fittings (DWTT). Service entrance heads for use with service entrance cable are covered under Service Entrance Cable Fittings (TYZX). Temporary wiring, such as round flexible cables or cords may be secured by the use of a connector suitable for use with flexible cord.

Floor Outlet Fittings — Floor outlet fittings are for use in concrete floors for coupling short lengths of exposed conduit to concealed systems when so installed that floor couplings do not come below surface of floor in which they are embedded and subject to the following restrictions: Elbow to be used only where conduit wires pass through fitting without splice, joint, or tap within fitting, and only where no more than one elbow is used in any conduit run. Tees to be used only where conductors are not drawn in until after main conduit installation is complete. If splices, joints, or taps are used in tees, conductors are intended to be looped that upon removing exposed conduit at floor coupling, splices, joints, or taps can readily be disconnected without interfering with other wiring within fitting.

CARTON MARKINGS

Fittings for use with flexible cords and marked "Liquid-Tight" on the carton indicates suitability for the use where directly exposed to oil spray or to rain.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Outlet Bushing," "Outlet Fitting," "Offset Adapter," "Bar Hanger," or other appropriate product name as shown in the individual Listings.

WALL OPENING PROTECTIVE MATERIALS (QCSN)

This category covers proprietary compositions that are used to maintain the hourly ratings of fire resistive walls and partitions containing flush mounted devices such as outlet boxes, electrical cabinets, and mechanical cabinets. The individual Classifications indicate the specific applications and the method of installation for which the materials have been evaluated.

Electrical devices should be installed in accordance with the provisions of the National Electrical Code, NFPA 70.

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

WALL OPENING PROTECTIVE MATERIAL
FIRE RESISTANCE CLASSIFICATION
SEE PRODUCT CATEGORY
IN UL FIRE RESISTANCE DIRECTORY
(Control No.)

OUTLET CIRCUIT TESTERS (QCYU)

This Listing covers portable devices with fixed attachment plug blades, or probes attached to flexible leads, used to indicate various wiring conditions in 15 or 20 Amp branch circuits by a pattern of lights or other similar means along with markings or instructions to identify the probable wiring conditions which cannot be determined by the tester.

The devices may include provisions for checking the functions of a Ground Fault Circuit Interrupter (GFCI), connected to the branch circuit.

These devices are not comprehensive diagnostic instruments.

Ground continuity indicating devices constructed integral with cord connector bodies for use on construction sites are Listed under Attachment Plugs, Fuseless (AXUT) as cord connector bodies.

The basic standard used to investigate products in this category is UL 1436, "Outlet Circuit Testers".

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Circuit Tester".

PACKAGED PUMPING SYSTEMS (QCZJ)

This category covers fluid handling systems consisting of pumps, electric motors, frequency drives, control valves, gauges and piping mounted on a structural steel base. They are used for plumbing boosters, heat transfer, hot water heating, HVAC chilled and hot water packages, irrigation, boiler feed and condensate packages, and similar applications. The system and components of the system are to be used within rated working pressure and used with appropriate liquids in accordance with system markings.

Systems included in this category have not been evaluated for the handling of hazardous materials.

Systems included in this category have not been evaluated for use as pump packages for fire protection services.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment", UL 778, "Motor-Operated Water Pumps" and UL508A the Outline of Investigation for "Industrial Control Panels". Packaged pumping systems for heating and cooling equipment are evaluated in accordance with UL 1995, "Heating And Cooling Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Packaged Pumping System".

PANELBOARDS (QEUY)

GENERAL

This category covers lighting and power panelboards rated 600 V or less.

Panelboards are intended for mounting in cabinets or cutout boxes which may be provided with the panel or provided separately. Only panelboards which are marked to indicate that they are for use in a specific box and panelboards labeled as "Enclosed Panelboards" have been investigated to determine that box wiring space is adequate.

USE, INSTALLATION AND MARKINGS

Enclosed panelboards identified with an enclosure type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Some enclosed panelboards have one or more openings for plug-in watt hour or similar meters. Such panelboards which are marked for outdoor use have, except for the joint between the plug-in meter and opening, been investigated for rain tightness.

Some panelboards are suitable for use as service equipment and may be so marked. Such marking is part of the Listing Mark as noted below or is an integral part of other required markings. Panelboards which are marked to indicate that they are suitable for use as service equipment and which can be removed from the enclosure are marked to identify the specific box or boxes in which they are intended to be installed. If the acceptability of such a panelboard for use as service equipment depends upon the condition of installation or use, the panelboard is marked to indicate those conditions.

Some panelboards incorporate neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only For Use As Service Equipment."

Panelboards marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Panelboards are marked with their short-circuit current rating in RMS symmetrical amps. The marking states that short-circuit ratings are limited to the lowest interrupting rating of (1) any device installed or intended to be installed therein and/or (2) any combination series-connected device. However, for combination series-connected devices, the short-circuit current rating marked on the panelboard may be higher than the short-circuit current rating of a specific circuit breaker installed or to be installed in the panelboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the panelboard in accordance with the marked instructions.

Panelboards to which units (circuit breakers, switches, etc.) may be added in the field are marked with the name or trademark of the manufacturer and the catalog number or equivalent of those units that are intended to be installed in the field. Individual Circuit Breakers and Ground Fault Circuit Interrupters (DKUY) may also be classified and marked as being suitable for use in certain panelboards in place of specific units marked on the panelboard.

Where in normal operation the load will continue for 3 hours or more, molded-case circuit breakers and fused switches other than fused power circuit devices should not be loaded to exceed 80 percent of their current rating, unless the device is otherwise marked. Low Voltage AC Power Switching Devices (PAPU) and Fused Power Circuit Devices (IYSR) used in panelboards are suitable for continuous use at 100 percent of their rating.

Some panelboards may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Panelboards as Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors as well as with copper conductors the panelboard will be marked "Use Copper or Aluminum Wire." A panelboard employing terminals or main or branch circuits units, individually marked "CU-AL" will be marked as noted above or "Use Copper Wire Only." The latter statement indicates that wiring space or other factors make the panelboard unsuitable for aluminum conductors.

Unless the panelboard is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger. However, 3-wire, single phase service entrance or feeder conductors for dwelling units may be as covered in Note 3 to Table 310-16 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Some panelboards, constructed with interlocked main switching and overcurrent protective devices, have been investigated for use in optional standby systems in accordance with Article 702 of the NEC and are marked "Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70," or, if provided within kit form, "Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70 when provided with interlock kit Cat No. ____."

CLASS CTL PANELBOARDS

Class CTL panelboards are identified by the words "Class CTL" on the Underwriters Laboratories Inc. Follow-Up Service Listing Mark.

Class CTL panelboards incorporate physical features which, in conjunction with the physical size, configuration, or other means provided in Class CTL circuit breakers, fuse holders, or fusible switches, are designed to prevent the installation of more overcurrent protective poles than that number for which the device is designed and rated.

MARINE PANELBOARDS

Some Listed enclosed panelboards in this category have been investigated for use aboard marine vessels over 65 ft in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259 (46CFR Parts 110-113). Such enclosed panelboards are identified by a Listing Mark for marine vessels over 65 ft in length.

The Electrical Engineering Regulations of the United States Coast Guard classify marine enclosed panelboards as "Non-watertight," "Drip-proof" or "Watertight."

A "Drip-proof" marine enclosed panelboard is so constructed that falling moisture or dirt does not interfere with the successful operation of the equipment.

A "Watertight" marine enclosed panelboard is so constructed that water does not enter the enclosure when subjected to a stream of water.

External means are provided for the operation of switches or circuit breakers in "Watertight" marine enclosed panelboards.

Marine enclosed panelboards which are classed "Drip-proof" or "Watertight" are marked to indicate this fact.

A marine enclosed panelboard for use in corrosive locations is marked "Suitable For Use In Corrosive Locations."

RECREATIONAL VEHICLE (RV) PANELBOARDS

Some Listed enclosed panelboards in this category have been investigated for RV use only. These panelboards generally consist of a line voltage/branch circuit section that complies with the requirements of UL 67, "Panelboards." The low voltage compartment complies with UL 458, "Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts" and is intended to be installed in accordance with Article 551 of the NEC. Such enclosed panelboards are identified by a Listing Mark for RVs. RV panelboards do not have inverter functions. Devices having combination panelboard/inverter capability are covered under Power Converters/Inverters and Power Converter/Inverter Systems (QPPY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 67, "Panelboards."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Panelboard," "Enclosed Panelboard," "Marine, Enclosed Panelboard for Use on Vessels Over 65 Feet," "Enclosed RV Panelboard." The product name may include the wording "Class CTL" or "Suitable For Use As Service Equipment" where appropriate. The product name "Enclosed Panelboard" covers both the panel and enclosure provided with it.

PANELBOARDS, MODULAR (QFOF)

This Listing covers modular panelboards rated 600 V or less. A modular panelboard includes the following types of modules: an enclosed panelboard or a column type panelboard and one or more accessory modules, such as termination boxes, enclosed switches, circuit breaker enclosures and the like. Each module has one or more openings in one or more sides of the enclosure for bus bar connections or terminals for field wiring connections to other related modules. The modules are specifically designed for use with each other and typically, they can be assembled in any sequence to meet various applications.

Each module of the system is marked for use with the other system modules, or each module is marked with a series designation common to all modules of a particular modular panelboard system.

Panelboard modules used in these Modular Panelboard systems are labeled "Panelboard Module" and all other system modules are labeled "Panelboard Accessory Module".

For additional information, see Panelboard Guide (QEUY).

The basic standard used to investigate products in this category is UL 67, "Panelboards". In addition, each accessory module is investigated in accordance with its applicable UL Standard.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Panelboard Module" or "Panelboard Accessory Module".

**DISTRIBUTED GENERATION POWER
SYSTEMS EQUIPMENT (QHWJ)****AC MODULES (QHYZ)****USE AND INSTALLATION**

This category covers AC modules that provide single-phase power at 50/60 Hz when exposed to sunlight. An AC module consists of a photovoltaic module and an integral static inverter that changes dc power to ac power. AC modules may be connected in parallel and are intended for operation interactive with an electric utility supply. They have been evaluated to deenergize their output upon loss of utility power.

These modules are rated up to 600 V dc input; 10 kW, 120/240 V ac or less, single-phase output.

These modules and panels are intended for mounting on buildings or on ground supported frames. Roof mounted modules or panels are evaluated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof, the module serves as the waterproof membrane. Direct mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack mounted styles are spaced away from the building's roof member. Rack mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building's roof system may adversely affect the roof covering materials' resistance to external fire exposure if the module has a lesser or no fire resistance rating. Roof covering materials will not be adversely affected when the modules have an equal or greater fire resistance rating than the roof covering material.

AC modules are marked with the maximum size of dedicated branch circuit on which they may be installed and the maximum number of modules which may be connected in parallel.

Installation of the modules, including connection between the modules and the branch circuit disconnecting means is to be in accordance with the provisions of NFPA 70, "National Electrical Code," (NEC) including Article 690. Authorities Having Jurisdiction should be consulted as to the conformance with applicable building codes including the class of roof covering.

AC modules provided with integral ground-fault detection and interruption means required by Sec. 690-5 of the NEC are identified by a marking on the product.

CLASSES

When applicable, modules or panels are identified as Class A, B or C to denote their Classification for resistance to external fire exposure. Modules or panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see UL's Roofing Materials and Systems Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1741, "Inverters, Converters, and Controllers for Use in Independent Power Systems" and UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Utility Interactive AC Module" or "Utility Interactive Inverter Module."

**PHOTOVOLTAIC CHARGE CONTROLLERS
(QIBP)**

This category covers permanently connected photovoltaic charge controllers that control the state of charge of storage batteries used in photovoltaic power systems.

Photovoltaic charge controllers covered by this Listing are rated 600 V dc or less and are intended to be installed in accordance with the National Electric Code, including Article 690.

Products covered by this category include photovoltaic charge controller subassemblies for field installation in a specific terminal compartment in accordance with the instructions supplied with the subassembly. The markings identify the modules in which the subassemblies may be installed or the electrical rating parameters (i.e. Voc and Isc) of the modules to which it is to be used with. The terminal compartments, modules and subassemblies are products of the same manufacturer.

Controllers having an enclosure that is identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in the guide information at the front of this Directory (AALZ).

The basic standard used to investigate products in this category is UL 1741, the proposed standard for "Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems"

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word "LISTED," a control number and one of the following product names: "Photovoltaic Charge Controller", "Photovoltaic Charge Controller Subassembly" or other appropriate product name as shown in the individual Listings.

**PHOTOVOLTAIC MODULES AND PANELS
(QIGU)****USE AND INSTALLATION**

This category covers flat-plate photovoltaic modules and panels.

These modules and panels are intended for mounting on buildings or on ground-supported frames. Roof mounted modules or panels are evaluated

for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof the module serves as the waterproof membrane. Direct mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack mounted styles are spaced away from the building's roof member. Rack mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building's roof system may adversely affect the roof covering materials' resistance to external fire exposure if the module has a lesser or no fire resistance rating. Roof covering materials will not be adversely affected when the modules have an equal or greater fire resistance rating than the roof covering material.

Photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. This category does not include AC modules; see AC Modules (QHYZ) for additional details. In addition to their voltage, current, and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is to be in accordance with the provisions of NFPA 70, "National Electrical Code." Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

CLASSES

When applicable, modules or panels are identified as Class A, B or C to denote their Classification for resistance to external fire exposure. Modules or panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see UL's Roofing Materials and Systems Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of photovoltaic modules and panels that not only meet the appropriate requirements of UL but also have been investigated in accordance with one or more of the following design qualification standards:

1. IEEE 1262:(issue date), "IEEE Recommended practice for qualification of photovoltaic (PV) modules"
2. IEC 61215:(issue date), "Crystalline silicon terrestrial photovoltaic modules - Design qualification and type approval"
3. IEC 61646:(issue date), "Thin-film terrestrial photovoltaic modules - Design qualification and approval"

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Module" or "Photovoltaic Panel."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEC or IEEE design qualification standards. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: "Also Classified IN ACCORDANCE WITH *," where "*" is one or more of the following:

1. IEEE 1262:(issue date)
2. IEC 61215:(issue date)
3. IEC 61646:(issue date)

DISTRIBUTED GENERATION POWER SYSTEMS ACCESSORY EQUIPMENT (QIIQ)

GENERAL

This category covers actuators, blocking diodes, conduit boxes, connectors, controllers (control boxes), communication modules, disconnects, distribution panels and transition boxes.

This accessory equipment is rated 600 V or less and is intended to be installed in accordance with NFPA 70, "National Electrical Code," including Articles 690 and 692.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, "Inverters, Converters, and Controllers for Use in Independent Power Systems."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Distributed Generation Utility Interconnection Controller," "Photovoltaic System Ground Fault Detector Interrupter," "Photovoltaic System Transition Box," "Photovoltaic Disconnect," "Photovoltaic System Control Box," "Photovoltaic System Connector," "Distributed Generation System Distribution Panel," "Distributed Generation Interface Module," "Distributed Generation Communications Module," or other appropriate product name as shown in the individual Listings.

PHOTOVOLTAIC POWER UNITS (QIJL)

Photovoltaic power units are factory wired assemblies consisting of photovoltaic modules or panels and other components such as charge controllers, inverters and batteries or other power storage systems.

These units are intended to provide power to utilization equipment. They are not intended to be connected to another electric power production source or system.

Photovoltaic power units covered in this category are rated 600 V ac or dc or less, 10kW or less. Fixed-mounted units are intended to be installed in accordance with the National Electrical Code, including Article 690.

Photovoltaic power units may be constructed as integral units, or as multiple sections for field assembly in accordance with the manufacturer's installation instructions.

The Standard for Flat-Plate Photovoltaic Modules and Panels, UL 1703, is used as a guide to investigate the photovoltaic modules or panels used with these products and the proposed Standard "Static Inverters and Charge Controllers for use in Photovoltaic Power Systems", UL 1741 is used as a guide to investigate inverters and charge controllers.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories, Inc. together with the word "LISTED", a control number and one of the following names: "Photovoltaic Power Unit", "Photovoltaic Power System" or other appropriate product name as shown in the individual Listing.

STATIC INVERTERS AND CONVERTERS FOR USE IN INDEPENDENT POWER SYSTEMS (QIKH)

USE AND INSTALLATION

This category covers permanently connected inverters and converters for use in electric power systems. Inverters are devices that change DC power to AC power. Converters are devices that accept AC or DC power input and convert it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system (batteries, capacitors, etc.). Electric power systems are defined as facilities that deliver electric power to a load. Devices covered in this category are classed as Utility Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive devices.

These products may contain energy storage devices and associated charge controllers.

These devices are intended for installation in accordance with NFPA 70, "National Electrical Code."

The devices may be connected to different types and combinations of distributed generation (DG) sources: generator sets, photovoltaic cells, fuel cells, wind and microturbines or other sources as specified in the manufacturer's installation instructions.

Some devices in this category must be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required.

These products may require external output overcurrent protection, which will be specified in product markings and installation instructions. The products require external overcurrent protection to be sized at 125 percent of the product output current rating unless otherwise specified.

These products may require that overcurrent protection be provided in the source circuits. These protection ratings will be specified in the product installation instructions.

Devices containing charge controllers are provided with instructions to indicate the type of battery for which they are intended.

ADJUNCT SURGE TESTING

At the manufacturer's request some devices in this category are subjected to Ring Wave and Combination Wave Surge Tests in IEEE C62.41-

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1991, "Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits." These particular surge waveforms that are applied to the DG equipment are based upon distance between the DG equipment and the service entrance equipment. These location categories have associated peak values of voltage and current for the standard surge-testing waveforms as noted below.

STANDARD WAVEFORM PEAK VALUES

Location Category	Ring Wave	Combination Wave
A1	2 kV/0.07 kA	N/A
A2	4 kV/0.13 kA	N/A
A3	6 kV/0.20 kA	N/A
B1	2 kV/0.17 kA	2 kV/1 kA
B2	4 kV/0.33 kA	4 kV/2 kA
B3	6 kV/0.50 kA	6 kV/3 kA
C1	N/A	6 kV/3 kA
C2	N/A	10 kV/5 kA
C3	N/A	20 kV/10 kA

The standard surge-testing waveforms are as follows:

"Standard 1.2/50 us – 8/20 us Combination Wave"

"Standard 0.5 us – 100 kHz Ring Wave"

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

CODES

The following summarizes and defines the codes shown in the individual Listings.

Source Type	ST
Fuel Cell	FC
Photovoltaic	PV
Microturbine	MT
Wind Turbine	WT
Hydro Turbine	HT
Battery	B
Gen Set	GS
Other	O

Output Type	OT
Utility Interactive	UI
Stand-alone	SA
Multimode Open Transition	MMOT
Multimode Closed Transition	MMCT
Charger	C

Utility Testing	UT
Has been evaluated for anti-islanding	AI
Has been evaluated for over/under voltage and frequency fluctuations with fixed trip limits	FTL
Has been evaluated for over/under voltage and frequency fluctuations with adjustable trip limits	ATL
Has not been evaluated for anti-islanding and may need external protection	NAI
Has not been evaluated for over/under voltage and frequency fluctuations and may need external protection	NTL

Isolation	Isol
Internal Transformer	IT
Transformerless	TL
External Transformer Specific (*)	ETS
External Transformer Generic (*)	ETG

(*) – See manufacturer's specifications for external transformer ratings, construction and configuration.

Power Output Configuration	POC
Single Phase 2-Wire	S2
Single Phase 3-Wire	S3
Three Phase 3-Wire	T3
Three Phase 4-Wire	T4

Maximum Overcurrent Protection	MOCP
Current rating in amps (example: 20 A)	20
Not applicable for Stand-alone units	NA

Enclosure Rating	ER
NEMA 12	12

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Enclosure Rating	ER
NEMA 3	3
NEMA 4	4
etc.	

Maximum Ambient of Operation	MA
Ambient rating in degrees Celsius (example: 60C)	60

Surge Category per IEEE C62.41	SC
Category A1	A1
Category A2	A2
Category A3	A3
Category B1	B1
Category B2	B2
Category B3	B3
Category C1	C1
Category C2	C2
Category C3	C3

RELATED PRODUCTS

Power converters and inverters intended for use in recreational or land vehicles and the like are covered under Power Converters/Inverters and Power Converter/Inverter Systems (PPY). Power converters and inverters intended for use in marine craft are covered under Power Converters/Inverters and Power Converter/Inverter Systems, Marine (QPQL) and Power Inverters, Marine (QPSY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, "Inverters, Converters and Controllers for Use in Independent Power Systems."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name. The product name is the combination of the specific DG source and the type of inverter or converter product. Acceptable product designations include "Fuel Cell Utility Interactive Inverter," "Microturbine Multimode Inverter," "Stand-alone Photovoltaic Inverter" or equivalent. If the source type does not appear in the product designation it must be indicated on the product as a separate marking.

PIN AND SLEEVE TYPE PLUGS, RECEPTACLES AND CABLE CONNECTORS (QLGD)

GENERAL:

The three sub categories below cover the following pin and sleeve type products:

Attachment Plugs, including Connectors

Receptacles

Receptacle-Plug Combinations, Classified for use in Specific Combinations

RATINGS:

The devices are rated in volts 600 volts or less, ac or dc; and in amps. Devices intended for use with motor loads are identified by a horsepower rating. Devices not intended for current interruption are marked "Do Not Disconnect Under Load," or with an equivalent statement.

Devices rated 250 volts are tested on circuits involving a nominal potential to ground of 125 volts. Devices having other voltage ratings are tested on circuits involving full rated potential to ground except for multiphase rated devices which are tested on circuits consistent with their voltage ratings, i.e. a 120/208 volt, 3 phase, device is tested on a circuit involving a potential to ground of 120 volts.

GROUNDING:

Devices having a terminal identified by a green colored finish or by the word "green" are grounding types. The pin or contact member connected to this terminal is for equipment grounding only.

The basic standard used to investigate products in the following three sub categories is UL1682 "Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type".

ATTACHMENT PLUGS, PIN AND SLEEVE TYPE (QLHN)

This listing covers pin and sleeve type attachment plug bodies, attachment plugs with and without fuses, cord connectors and adapters.

These devices are intended for use with the same line of products Listed under the category of Receptacles, Pin And Sleeve Type (QLIW). Devices Classified for use in specific combinations with other manufacturers' products are covered under the category of Receptacle-Plug Combinations, Pin And Sleeve Type, Classified For Use In Specific Combinations (QLKH).

The termination provisions of these devices are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the National Electrical Code. The ampacity of the flexible cords and cables is based on Section 400-5, tables 400-5(A) and 400-5(B). The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. Unless the product is marked with both the size and temperature rating of the flexible cord or cable to be used, the termination provisions are based on the use of 60 C flexible cord or cable.

This listing does not cover devices to be molded on flexible cord or cable and unassembled devices to be factory assembled to flexible cord or cable.

The Listing Mark for Underwriters Laboratories Inc. smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product names as appropriate: "Pin and Sleeve Attachment Plug", "Plug", "Connector" or other appropriate product name.

RECEPTACLES, PIN AND SLEEVE TYPE (QLIW)

This listing covers pin and sleeve type receptacles and other outlet devices intended for direct connection to wiring systems recognized by the National Electrical Code. It also covers other pin and sleeve type receptacles, outlet devices and power inlets intended for use in appliances and other equipment.

These devices are intended for use with the same line of products Listed under the category of Attachment Plugs, Pin And Sleeve Type (QLHN). Devices Classified for use in specific combinations with other manufacturers' products are covered under the category of Receptacle-Plug Combinations, Pin And Sleeve Type, Classified For Use In Specific Combinations (QLKH).

The termination provisions of these devices are intended for use with copper conductors and are marked to indicate the conductor size and temperature rating of all field installed conductors. Such markings are located where readily visible on the device or in a wiring diagram provided with the device. If no marking is provided, the termination provisions are based on the use of 60C insulated conductors in circuits rated 100 amps or less, and the use of 75C insulated conductors in circuits rated more than 100 amps as specified in Table 310-16 of the National Electrical Code.

Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60C ampacity (devices rated 100 amps or less) or 75C ampacity (devices rated over 100 amps).

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product names as appropriate: "Pin and Sleeve Receptacle", "Receptacle", "Switched Receptacle", "Power Inlet" or other appropriate product name.

RECEPTACLE-PLUG COMBINATIONS, PIN AND SLEEVE TYPE, CLASSIFIED FOR USE IN SPECIFIC COMBINATIONS (QLKH)

This category covers combinations of Listed pin and sleeve type plugs, receptacles, power inlets and connectors that have been investigated for use in specific combinations indicated.

These combination devices have been evaluated for use in ordinary locations with other manufacturer's Listed plugs, receptacles, connectors or power inlets. Basic Listings are under ATTACHMENT PLUGS, PIN AND

SLEEVE TYPE and RECEPTACLES, PIN AND SLEEVE TYPE with additional Listings under Attachment Plugs, Fuseless (AXUT) and Attachment Plug Receptacles and Plugs (RTRT).

The Classification Marking of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the appropriate Listing Mark and the statement: "Also Classified by Underwriters Laboratories Inc. For Use In Specific Combinations", and one of the following statements "For Use With UL Listed _____ (* "Receptacle", "Plug" or "Connector"), Catalog No. _____", or "For Catalog Numbers of Compatible Devices, refer to Publication No. _____ provided with this device. If additional information is necessary contact the factory." The referenced publication is a compatibility list which tabulates the company name, catalog number and electrical ratings of the Classified Device and the company name and catalog number of the applicable UL Listed product with which it has been investigated. One copy of the compatibility list is provided with each device.

POLYVINYL CHLORIDE SOLVENT CEMENT (QORV)

Polyvinyl chloride solvent cements are Classified in accordance with the materials and applicable performance requirements in the American Society For Testing and Materials Standard "Specification For Solvent Cements For Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings," ASTM D2564.

The solvent cements are intended to be used in joining Listed Schedule 40 and Schedule 80 PVC Plastic Rigid Nonmetallic Conduit, Plastic Underground Rigid Nonmetallic Conduit, Electrical Nonmetallic Tubing, and Classified Sewer Pipe in non-pressurized systems.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify Polyvinyl Chloride Solvent Cement produced under its Classification and Follow-Up Service.

**POLYVINYL CHLORIDE SOLVENT CEMENT [FOR
SCHEDULE 40 AND SCHEDULE 80 PVC PLASTIC RIGID
NONMETALLIC CONDUIT,
PLASTIC UNDERGROUND RIGID NONMETALLIC CONDUIT,
ELECTRICAL NONMETALLIC TUBING,
AND/OR SEWER PIPE]
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH ASTM D2564
WITH RESPECT TO MATERIALS AND
APPLICABLE PERFORMANCE REQUIREMENTS
FOR NON-PRESSURIZED SYSTEMS**

**PORTABLE POWER CABLE (QPMU)
GENERAL**

This category covers portable power cable constructed and Listed for use in accordance with Article 400 of NFPA 70, "National Electrical Code" (NEC). Portable power cable consists of either a single insulated conductor or two or more insulated conductors, with or without grounding conductors, with an overall fiber reinforced jacket. The insulation and jacket are thermoset on Types G, G-GC and W, and thermoplastic elastomer on Type PPE.

This cable is used to supply power to mobile equipment and machinery and is rated 2000 V, 90°C (194°F) dry, and 60°C (140°F) where exposed to oil. For cable so marked, ratings of 60°C (140°F), 75°C (167°F), or 90°C (194°F) "wet" are also assigned. The term "wet" indicates that the cable is acceptable for immersion in water. Cable that has been investigated for use where exposed to the direct rays of the sun is marked "Sunlight Resistant" or "Sun Res."

Portable power cable employs flexible stranded copper conductors in a size range of 12 AWG to 500 kcmil, except for single conductor Type W and single conductor Type PPE which employs flexible stranded copper conductors in sizes 12 AWG to 1000 kcmil. Ampacities for portable power cable can be found in Table 400.5(B) of the NEC.

Type G — Contains 2 – 6 circuit conductors and a grounding conductor. The grounding conductor is either bare or covered with a green-colored braid or tape, and may either be a single conductor or be sectioned into two or more parts.

Type G-GC — Same as Type G except that the cable also contains one, 10 AWG or larger, yellow insulated conductor which is used as a ground check.

Type W — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

Type PPE — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 62, "Flexible Cord and Fixture Wire," UL 44, "Thermoset-Insulated Wires and Cables" and UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Power Cable."

POWER AND CONTROL TRAY CABLE (QPOR)

GENERAL

This category covers Type TC power and control tray cable intended for use in accordance with Article 336 of NFPA 70, "National Electrical Code" (NEC). The cable consists of one or more pairs of thermocouple extension wires or two or more insulated conductors, with or without one or more grounding conductors, with or without one or more optical fiber members and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductor is fully insulated and has a distinctive surface marking. The cable is rated 600 or 2000 V.

The cable is Listed in conductor sizes 18 AWG to 1000 kcmil copper or 12 to 1000 kcmil aluminum or copper-clad aluminum. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are Listed in sizes 24 to 12 AWG.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surfaced printed "AL (CU-CLAD)" or "Cu-clad AL."

Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

If the type designation of the conductors is marked on the outside surface of the cable, the temperature rating of the cable corresponds to the rating of the individual conductors. When this marking does not appear, the temperature rating of the cable is 60°C unless otherwise marked on the surface of the cable.

Fittings for use with this cable is covered under Outlet Bushings and Fittings (QCRV), Nonmetallic-sheathed Cable Connectors (PXJV) or Service Entrance Cable Fittings (TYZX). Cable investigated for use where exposed to direct rays of the sun is marked "sunlight resistant."

Cable investigated for direct burial in the earth is so identified.

Cable suitable for use as open wiring between cable trays and utilization equipment in accordance with NEC Section 336.10(6) is surface marked "open wiring."

Cable consisting of thermocouple extension wires is surface marked "THCPL EXTN," "For thermocouple extension use only" or "Thermocouple extension wire only."

Cable surface marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked "Oil Resistant II" or "Oil Res II."

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "LS."

Cable containing optical fiber members is identified with the suffix "OF."

Regarding cable seals outlined in Article 501 of the NEC, Type TC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for transmission of gases or vapors through its core.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1277, "Electrical Power and Control Tray Cables with Optional Optical-Fiber Members."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Power and control tray cable that contains copper or copper-clad aluminum conductors has the product name "Power and Control Tray Cable Type TC"; power and control tray cable that contains aluminum conductors has the product name "Aluminum Power and Control Tray Cable Type TC."

POWER AND CONTROL TRAY CABLE CONNECTORS (QPOZ)

USE

This category covers power and control tray cable connectors for use with Type TC cable installed in accordance with Article 340 of NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

The connector or smallest unit shipping carton for the connectors is marked with the smallest and largest cable diameters for which the connectors have been investigated. In addition, the connectors or cartons are marked "Dry Location," "Sunlight Resistant," "Oil Resistant I" or "Oil Resistant II." Cable connectors marked "Oil Resistant I" are suitable for exposure to mineral oil at 60°C. Cable connectors marked "Oil Resistant II" are suitable for exposure to mineral oil at 75°C.

Some connectors are also acceptable for use with armored cable, flexible metal conduit, nonmetallic-sheathed cable, cords or service entrance cable when marked on the device or carton.

ADDITIONAL INFORMATION

For additional information, see Power and Control Tray Cable (QPOR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size and shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Tray Cable Connector."

POWER CABLE ASSEMBLIES (QPPL)

USE AND INSTALLATION

This category covers power cable assemblies and pendant power cable assemblies intended for installation between individual units of a communications or similar system where the cables are outside the equipment enclosure. These cable assemblies are intended for use on circuits rated 600 V or less, and only in areas where access is restricted to qualified persons. They are not intended to be disconnected under load and are so marked.

Power cable assemblies employ Listed multiconductor power and control tray cable and male or female connectors, wire connectors, or other means to connect the cable to appropriate terminations in the individual units of the system. These assemblies are intended to be installed in cable trays in accordance with Article 392 of NFPA 70, "National Electrical Code" (NEC). Up to 7 ft of the cable assembly may be exposed between the cable tray and the equipment in locations where the cable assembly is protected from physical damage. These assemblies are intended to be connected on the load side of Listed overcurrent devices in accordance with Section 240.21(A) of the NEC (2002). Power cable assemblies are rated in volts and amps denoting the maximum permissible load current through the assembly in free air at nominal 30°C (86°F). The ampacity of the cable may need to be derated in accordance with Section 392.9 of the NEC.

Pendant power cable assemblies employ Listed bus drop cable or Listed flexible cord or cable intended for hard usage. They employ female connectors, wire connectors, or other means to terminate the cord or cable to a mating male connector, bus bar, or field wiring terminals. Mating connectors are identified on the assembly or accompanying instructions. These assemblies are intended to be connected on the load side of Listed overcurrent devices in accordance with Section 240.21(A) of the NEC (2002). They are provided with a tension take-up device, strain relief, or other means of preventing tension from being transmitted to the wiring

terminals to facilitate installation in accordance with Section 368.8 of the NEC. Pendant power cable assemblies are rated in volts and amps denoting the maximum permissible load current through the assembly in free air at nominal 30°C (86°F). The ampacity of the flexible cord or cable may need to be derated in accordance with Section 400.5 of the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2055, "Outline of Investigation for Power Cable Assemblies."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Cable Assembly" or "Pendant Power Cable Assembly."

POWER CONVERTERS/INVERTERS AND POWER CONVERTER/INVERTER SYSTEMS (QPPY)

USE AND INSTALLATION

This category covers (1) fixed and stationary power converters, power inverters, power converter systems and power inverter systems for use in recreational vehicles in accordance with National Electrical Code, NFPA 70, (2) portable, stationary and fixed power converters, power inverters, power converter systems and power inverter systems for use in land vehicles, and (3) accessories for power converters and power inverters.

Power converters are primarily rectifying units intended for connection to a 120 V or 120/240 V, 15 or 20 A branch circuit supplied from the recreational vehicle panelboard and designed to provide low direct voltage for equipment in the recreational vehicle. A power converter may also include a battery charging feature.

Power inverters are intended for connection to a battery source within a land vehicle. They are designed to supply ac voltage for equipment in a land vehicle. A power inverter may be provided with an ac transfer option to supply the output from an ac distribution system when the inverter is connected to such a system. A power inverter may also include a battery charging feature.

Power converter systems consist of a power converter and not more than three integral line voltage branch circuit protective devices. Power inverter systems consist of a power inverter and not more than three integral line voltage branch circuit protective devices. A main disconnecting means is provided if more than two branch circuit protective devices are incorporated.

A power converter system or power inverter system may serve the function of a distribution panelboard in a land vehicle. They are intended to be connected directly to an ac distribution system by means of a power supply cord.

REBUILT PRODUCTS

This category also covers units that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt units are subject to the same requirements as new products.

RELATED PRODUCTS

A land vehicle main distribution center incorporating more than three branch circuit protective devices used in conjunction with a power converter or power inverter are covered under Panelboards (QEUY).

Power converters, power inverters, power converter systems and power inverter systems for use on a marine craft are covered under Power Converters/Inverters and Power Converter/Inverter Systems, Marine (QPQL) and Power Inverters, Marine (QPSY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 458, "Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory)

together with the word "LISTED," a control number, and one of the following product names as appropriate: "Power Converter," "Power Inverter," "Power Converter System," "Power Inverter System," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

POWER DISTRIBUTION BLOCKS (QPQS)

This category covers power distribution blocks rated 600 volts or less and intended to be used on the load side of service equipment in accordance with the National Electrical Code, NFPA 70. These blocks are used for splicing and tapping conductors in metallic wireways, auxiliary gutters, junction boxes, termination boxes and the like in order to distribute power to separate circuits or loads.

A power distribution block consists of a connector(s) mounted on an insulating base. Each individual connector has provisions for connection of one or more conductors and multiple smaller tap-off conductors.

Power distribution blocks are considered suitable for use on circuits having available fault current not greater than 10,000 RMS symmetrical amps, unless marked with a larger value.

Installation instructions are provided for proper mounting and use. These instructions include minimum enclosure dimensions.

The power distribution block is marked with the letters "AL" to indicate use with aluminum conductors only; "CU" : to indicate for use with copper conductors only; or "CU" and "AL" to indicate for use with either type of conductor.

The power distribution block is marked with:

- a) a "7" or "9" in conjunction with the "AL" or "AL-CU" marking. This marking corresponds with the marking on the individual connector, i.e. AL7CU, AL9, etc.
- b) a torque associated with each conductor tightening means.
- c) an amp rating that signifies the maximum current per pole and
- d) a voltage rating.

The basic requirements used to investigate products in this category are contained in Subject 1953, "Outline of Investigation For Power Distribution Blocks" .

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and the following product name: "Power Distribution Block" .

POWER DISTRIBUTION CENTERS FOR COMMUNICATIONS EQUIPMENT (QPQY)

GENERAL

This category covers power distribution centers for communications equipment rated 600 V or less.

Power distribution centers contain equipment such as circuit breakers, suitable investigated supplementary protectors, contactors, fuses, switches, including pull-out types and related accessory equipment.

Some centers incorporate constructions designed to provide safety for the operator. These centers are dead front but may be open at the back, bottom, top or sides. Other centers may employ special alarm indicating fuses that have exposed live parts extending through the front. The distribution centers that incorporate special alarm fuses or that are not provided with a complete enclosure are intended for installation in places accessible only to qualified persons and are so marked.

INSTALLATION

Some equipment has been evaluated for installation in a restricted access location, such as a dedicated equipment room or telecommunication equipment closet, where access is limited to trained service personnel. Such equipment is provided with a marking or installation instructions which state "To be installed only in a Restricted Access Location" or similar wording. Equipment installed in a restricted access location generally receives power from a centralized d.c. power source. If field wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

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Power distribution centers are marked with their short circuit current rating. This marking may be presented as a d.c. rating in amps, a description of the battery power supply such as "Suitable For Use In Circuits Powered By Up To Five Banks Of 48 V, 200 A-Hr. Batteries" or a combination of both. A battery "bank" consists of a sufficient number of series-connected batteries to obtain the required system voltage. A number of "banks" are then wired in parallel to obtain the desired system A-Hr. capacity.

A distribution center having provision for the field installation of additional equipment such as circuit breakers, contactors, switches or the like is marked with the name or trademark of the manufacturer and the catalog number or equivalent of those devices that are intended to be installed in the field.

Power distribution centers are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG and on the use of 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310-16 of the NEC.

RELATED EQUIPMENT

Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ) and Power Supplies, Telephone (QQJE).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60950, "Safety of Information Technology Equipment" and Subject 1801, "Outline of Investigation for Power Distribution Centers for Communications Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Distribution Center for Communications Equipment."

**POWER DISTRIBUTION EQUIPMENT,
PORTABLE (QPRW)****USE**

This category covers portable power distribution units and devices, and portable power distribution panels intended for use in the following locations:

- Carnivals, circuses, fairs and similar locations in accordance with Article 525 of NFPA 70, "National Electrical Code" (NEC),
- Exhibition halls or similar locations in accordance with Article 518 of the NEC,
- Theaters, audience areas of motion picture and television studios and similar locations in accordance with Article 520 of the NEC,
- Motion picture and television studios and similar locations in accordance with Article 530 of the NEC,
- Construction sites in accordance with Article 305 of the NEC.

RATINGS

This category covers units rated 600 V or less, single- or multi-phase. Units are rated maximum 1200 A.

Short Circuit Rating — Units are intended for connection to supplies with a maximum available fault current of 10,000 A.

Supply Neutral Termination — Units rated for use on either 208Y/120 V 3-phase, 4-wire with ground supplies and marked "200 Percent Neutral" are suitable for use at full rating when connected to a 120/240 V single-phase, 3-wire supply. They are provided with supply neutral receptacles and wiring having an ampacity of twice the ampacity of the largest supply terminal. Units specifically rated for both 208Y/120 V 3-phase, 4-wire and 120/240 V single phase, 3-wire supplies are suitable only at the rating specified for the type of supply being used.

Units employing single conductor supply cables and rated for use on 208Y/120 V 3-phase, 4-wire supplies that are also suitable for use with electronic dimmers and other nonlinear loads are marked "130 Percent Neutral - Suitable For Use With Electronic Dimmers."

PRODUCT MARKINGS

Accessibility — Units intended for use in areas not accessible by the general public are marked "TO BE USED WHERE NOT READILY ACCESSIBLE BY THE GENERAL PUBLIC."

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Conductors in Parallel — Units intended for parallel connection of feeder or output conductors are marked accordingly.

Duty Rating — Outputs are not suitable for continuous use unless marked otherwise.

Ground Fault Protection — Only those receptacles so marked are provided with ground fault circuit protection for personnel.

Indoor/Outdoor Use — Units are marked with either enclosure type numbers 1 or 3R, or "Suitable For Use In Damp Locations." Units marked "Type 1" may additionally be marked "Indoor Use Only." Those marked "Type 3R" may additionally be marked "Rainproof." Units marked "Suitable For Use In Damp Locations" are for indoor or outdoor use in areas subject to moderate degrees of moisture as specified in Article 100 of the NEC. This would also include areas where artificial rain is being produced, or when effect machines that utilize water vapor to generate fog or mist effects are being used. In such environments these units are intended to be provided with temporary shelters for protection from falling or blowing water. Unless a unit is marked for use with a specific shelter, the suitability of the temporary shelter is to be determined by the Authority Having Jurisdiction.

Qualified Personnel — Units intended for use by qualified personnel are marked "FOR USE BY QUALIFIED PERSONNEL ONLY."

RELATED PRODUCTS

Units for use in theater or studio rigging immediately adjacent to stage lighting fixtures are covered under Stage and Studio Luminaires and Connector Strips (IFDZ). Portable cord-connected units rated 250 V ac or less, 20 A or less, intended for indoor use as multiple outlet extensions of a branch circuit to a central location to supply laboratory equipment, a home workshop, home movie lighting control, etc. are covered under Relocatable Power Taps (XBYS). Connector assemblies consisting of only factory assembled plugs and cord connectors attached to extra hard service cords or cables are covered under Cord Sets and Power Supply Cords (ELBZ).

Connector assemblies consisting of only factory-assembled plugs and cord connectors attached to extra-hard service cords or cables that are intended specifically and solely for undercarpet use at tradeshow are covered as undercarpet cord sets in Tradeshow Equipment - Exhibition Display Units, Accessories (XNRU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1640, "Portable Power Distribution Units."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Portable Power Distribution Unit," "Port Pwr Dist Unit," "Construction Site Portable Power Distribution Unit" or "Construction Site Port Pwr Dist Unit."

The Listing Mark of partially enclosed, plastic framed cable splicing blocks is the same as that specified above except the product name is "Open Frame Cable Splicing Block."

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which bus bar clamps are packaged and additionally provided with the UL symbol on the bus bar clamp is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for bus bar clamps includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Bus Bar Clamp."

**PORTABLE POWER DISTRIBUTION UNITS
AND DEVICES (QPSH)**

This Listing covers portable power distribution equipment of standardized type or configuration. Each unit has a marked Model, Type or Catalog Number.

Portable power distribution units are assemblies of Listed products, Recognized components, or both, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, control components, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

This Listing also covers cable mounted bus bar clamps for use with portable power distribution units as well as partially enclosed, plastic framed cable splicing blocks.

For additional information, see Power Distribution Equipment - Portable, Guide (QPRW).

BUS BAR CLAMPS (sister lugs)

Bus bar clamps are for use by qualified personnel only. Cables terminating to bus bar clamps should be tied or otherwise supported so that flex-

ing or strain on the conductors is not transmitted to the conductor termination at the bus bar clamp. Solder lug type units are not suitable to terminate an equipment grounding conductor. Bus bar clamps are marked with their range of intended wire sizes and their maximum current rating.

CABLE SPLICING BLOCKS (SPIDERS)

Partially enclosed, plastic framed cable splicing blocks are suitable for outdoor use, damp locations. They are suitable to be exposed to rain or water spray when not energized. Following such an exposure they are intended to be dried and inspected prior to energization. They are intended for use by qualified personnel in areas not readily accessible by the general public. They are intended for installations covered by Articles 520 and 530 of the National Electrical Code.

CONSTRUCTION SITE UNITS

Units identified as "Construction Site Portable Power Distribution Units" or with similar identifiers that are marked as providing ground fault protection for personnel either exhibit the performance characteristics of a Class A ground-fault circuit-interrupter or de-energize protected the output circuits in the presence of one or more of the following conditions:

1. Any two power supply conductors are reversed.
2. There is an open circuit in either the grounded supply conductor or any of the ungrounded supply conductors.

LISTING MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify portable power distribution units manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Portable Power Distribution Unit", "Port Pwr Dist Unit", "Construction Site Portable Power Distribution Unit" or "Construction Site Port Pwr Dist Unit". "Equipment" may be substituted for "Unit".

The Listing Mark of partially enclosed, plastic framed cable splicing blocks is the same as that specified above except the product name is "Open Frame Cable Splicing Block".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which bus bar clamps are packaged and additionally provided with the UL symbol on the bus bar clamp is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for bus bar clamps includes the symbol of Underwriters Laboratories Inc. together with the word "LISTED", a control number, and the product name "Bus Bar Clamp".

PORTABLE POWER DISTRIBUTION PANELS (QPSM)

This Listing covers portable power distribution panels built for specific applications.

These products are assemblies of Listed products, Recognized components, or both, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

These panels are intended for use in applications specified for "Portable Power Distribution Units" in the National Electrical Code.

For additional information, see Power Distribution Equipment — Portable Guide QPRW.

LISTING MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Portable Power Distribution Panel".

POWER LIMITED CIRCUIT CABLE (QPTZ)

USE

This category covers power limited circuit cable intended for use in Class 2 or Class 3 circuits as described in Article 725 of NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

Cable with a nonmetallic jacket is identified by a marking on the surface of the jacket or on a marker tape under the jacket. Cable with an outer metal sheath is identified by a marking on a tag attached to the reel or coil. This marking includes one of the following Type designations:

CL2P or CL3P — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 725.61(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5 a maximum average

optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

CL2R or CL3R — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in vertical shafts in accordance with Section 725.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CL2 or CL3 — Indicates cable intended for general use in Class 2 or Class 3 circuits within buildings in accordance with Section 725.61(E) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

CL2X or CL3X — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings (1) where the cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) in one- or two-family or multi-family dwellings when the cable diameter is less than 0.25 in., in accordance with Section 725.61(E) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

PLTC — Indicates cable for use in Class 3 circuits within buildings that is suitable for use in cable trays, in accordance with Sections 725.61(C) and (D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," are surface marked "Limited Combustible."

Type PLTC cable suitable for use as open wiring between cable trays and utilization equipment in accordance with Section 725.61(D)(4) of the NEC is surface marked "open wiring."

Listed cable which is additionally marked "In Accordance With [Specification name and/or number]" complies with the requirements of the transmission performance specification referenced and is manufactured under an acceptable quality assurance system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 13, "Power-Limited Circuit Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Power Limited Circuit Cable."

Cable verified to another transmission performance specification has the Marking "Verified In Accordance With [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

POWER OUTLETS AND POWER OUTLET FITTINGS (QPYV)

Power outlets are not intended for use in recreational vehicle parks or in marinas unless so marked.

This listing covers power outlets rated at 600 volts or less. Although not restricted to such use, power outlets are intended for use in indoor and outdoor installations where power is required to operate portable, mobile or temporarily installed equipment.

Where intended for use as service equipment for mobile homes, temporary sites, marinas and boatyards, or any combination of these, the appropriate wording appears in the marking "Suitable For Use As Service Equipment For _____." Power outlets so marked for use as service equipment, are provided with overcurrent protection and disconnecting means for service conductors, as well as means for grounding the service neutral conductor.

Power outlets not marked for a specific service use, as described in the previous paragraph, and not incorporating receptacles are suitable as service equipment if marked "Suitable For Use As Service Equipment" or where the neutral is factory bonded to the enclosure, "Suitable For Use Only As Service Equipment".

Power outlets may contain attachment plug receptacles, circuit breakers, fuse holders, fused switches and facilities for watt hour meters.

A post type power outlet is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support. The mounting post contains markings indicating the proper grade level.

A power outlet with a mounting pedestal is intended for mounting on a concrete slab.

Unless marked otherwise, a mounting post, pedestal or fitting is not intended to serve as the sole support of a mast for overhead wiring.

Power outlets for use with separable, field-installed fittings, such as interchangeable panels, circuit breakers and mounting posts are marked to indicate those fittings with which they are intended to be used.

Power outlets containing overcurrent protection are marked with their short circuit current ratings in RMS symmetrical amps.

Where in normal operation the load will continue for 3 hours or more, molded case circuit breakers and fuses should not be loaded to exceed 80 percent of their current rating.

Investigation of a Power Outlet includes a test designed to simulate exposure to beating rain to determine that such exposure will not interfere with successful operation of the apparatus within the enclosure nor result in wetting of the exposed faces of receptacles and associated attachment plugs.

Power outlets are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60 C ampacities for wire sizes Nos. 14-1 and of 75 C ampacities for wire sizes Nos. 1/0 Awg and larger.

The basic standard used to investigate products in this category is UL231, "Power Outlets".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Power Outlet", "Power Outlet Fitting".

POWER SUPPLIES (QQAQ)

These categories cover the following types of power supplies intended for use in ordinary locations in accordance with the National Electrical Code.

General Purpose Power Supplies

Specialty Power Supplies

Telephone Power Supplies

Gas Tube Sign Power Supplies

Information Technology Equipment Power Supplies

The investigation of a device covered in these categories does not include the effects it may have on the system or equipment connected thereto.

Power supplies intended as components of fire protective signaling systems and burglary protective signaling systems equipment are covered in the Fire Protection Equipment Directory and Security Equipment Directory, respectively.

Power supplies for use in health care facilities are listed in the Electrical Appliance and Utilization Equipment Directory under Power Supplies for use in Health Care Facilities, Guide KFCG.

Power supplies classified in accordance with IEC publications are listed in this directory under Power Supplies Classified In Accordance With IEC Publications, Guide QQQV.

Power supplies for use in recreational vehicles are listed in this directory under Power Converters and Power Converter Systems, Guide QPPY.

A power supply not covered under one of the above mentioned categories and for use with only a specific product may be covered under the category of the specific product.

The Listing Mark of Underwriters Laboratories Inc. on products covered under these categories does not extend to connected equipment.

POWER SUPPLIES, GAS TUBE SIGN (QQDZ)

This listing covers indoor and outdoor use power supplies for use with display signs employing glass tubes containing gases as the illuminant.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

Power supplies provided with power supply cords are not suitable for use outdoors. Power supplies suitable for indoor use only are so marked.

Power supplies for use in wet locations as defined in the National Electrical Code are so marked. Unmarked designs are intended for outdoor use within a sign body or equivalent enclosure, and damp locations as defined in the National Electrical Code.

The basic standards used to investigate products in this category are UL1012, "Power Units Other Than Class 2" and UL506, "Specialty Transformers".

See also "Transformers, Gas Tube Sign", Guide XPMR.

For additional information, see Power Supplies Guide QQAQ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Gas Tube Sign Power Supply".

The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

POWER SUPPLIES, GENERAL PURPOSE (QQFU)

This listing covers indoor and outdoor use power supplies having input ratings of not more than 600 volts, direct and alternating current.

Power supplies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in the information at the front of this directory under Equipment for use in Ordinary Locations, Guide AALZ.

Power supplies which are marked "Intended for installation in a protected environment" or the equivalent are intended to be used in a temperature and humidity - controlled indoor area that is relatively free of conductive contaminate.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

The basic standard used to investigate products in this category is UL1012, (Fifth Edition) "Power Units Other Than Class 2".

Telephone Power Supplies covered under this category were investigated to the telephone power supply requirements present in UL1012, "Power Supplies", (Fourth Edition). Telephone Power Supplies investigated to UL1459, "Telephone Equipment", are listed under Guide QQJE in this directory.

Other power supplies under this category with a specific use application indicated are being transferred to the Specialty Power Supplies subcategory, Guide QQIJ. During the transition, these power supplies may appear under either QQFU or QQIJ. Refer to Guide QQIJ for additional information.

For additional information, see Power Supplies Guide QQAQ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Power Supply".

The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

POWER SUPPLIES, INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT (QQGQ)

This category covers power supplies rated 600 V or less intended for use with information technology equipment (ITE) including electrical business equipment. End-use products that employ these types of power supplies are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ) in the Electrical Appliance and Utilization Equipment Directory.

These power supplies are stand-alone units that deliver power to ITE via external interconnecting means.

This category also covers modular accessory power supplies. Such power supplies are types that are intended for field installation within personal computers, similar ITE, including telephone equipment. These modular power supplies are also provided with installation instructions relative to safe installation.

The investigation of a product covered under this category does not include the effects it may have on the system or equipment to which it is connected.

This category also covers Listed power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

All power supply types Listed under this category are marked with input and output ratings that include the voltage and intended maximum load rating in amperes.

When Listed power supplies intended for use with a detachable power supply cord are not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit is to be separately provided.

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1950, "Safety of Information Technology Equipment, Including Electrical Business Equipment" or UL 60950, "Safety of Information Technology Equipment."

All low-voltage outputs (maximum 42.4 V peak or 60 V dc) are safety extra low voltage (SELV) as defined in the Standard. An output marked "LPS" has been determined to have an output level at or below the limited power source level specified in the Standard, as it relates to the requirements for equipment supplied by the output.

An output marked "Class 2" has additionally been evaluated to UL 1310, "Class 2 Power Units."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following category identifiers: "Information Technology Equipment Power Supply," "I.T.E. Power Supply" or "QQGQ Power Supply."

The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the above product name.

The Accessory Listing Mark is applied to the modular accessory power supplies on an external surface that will be enclosed within the end-use product. The category identifier for these units is provided with the additional word "Accessory."

POWER SUPPLIES, SPECIALTY (QQIJ)

This listing covers indoor and outdoor use power supplies having input ratings of not more than 600 volts, direct and alternating current.

These power supplies are intended for, but not necessarily limited to, specific uses such as to supply some household appliances, electroplating equipment, school laboratory equipment, pipe organs, cathodic protection equipment, power supply-battery charger combinations, and industrial equipment, including inverters and converters.

Power supplies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in the information at the front of this directory under Equipment for use in Ordinary Locations, Guide AALZ.

Power supplies which are marked "Intended for installation in a protected environment" or the equivalent are intended to be used in a temperature and humidity - controlled undoor area that is relatively free of conductive contaminate.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

The basic standard used to investigate products in this category is UL1012, "Power Units Other Than Class 2".

For additional information, see Power Supplies Guide QQAQ and Power Supplies, General Purpose Guide QQFU.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the appropriate product name as shown in the individual listing. The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

POWER SUPPLIES, TELEPHONE (QQJE)

This listing covers telephone power supplies having input ratings of not more than 600 volts, direct and alternating current, intended for use with telephone exchange equipment, telephone appliances, and telephone accessories.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

The basic standard used to investigate products in this category is UL1459, "Telephone Equipment".

For additional information, see Power Supplies Guide QQAQ and Power Supplies, General Purpose Guide QQFU.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Telephone Power Supply". The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

POWER SUPPLIES, GAS TUBE SIGN (QQQK)

This Listing covers indoor and outdoor use power supplies for use with display signs employing glass tubes containing gases as the illuminant.

Power supplies provided with power supply cords are not suitable for use outdoors. Power supplies if suitable for indoor use only are so marked; power supplies for use in wet locations as defined in the National Electrical Code are so marked; unmarked designs are intended for outdoor use within a sign body or equivalent enclosure, and damp locations as defined in the National Electrical Code.

The effects on the sign to which these devices may be connected have not been investigated. Gas Tube Sign Power Supplies intended for use with a specific gas tube length, diameter, and gas type are so tested and marked; the use of greater lengths or other diameters or types of gases may result in overheating of the power supply.

The basic standards used to investigate products in this category are UL1012, "Power Supplies" and UL 506, "Specialty Transformers".

See also, "Transformers, Gas Tube Sign", Guide XPMR.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Tube Sign Power Supply".

NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS (QQRK)

This category includes cables which are factory assemblies of one or more Listed insulated wires or cables, and may include one or more insulated or bare equipment grounding conductor(s), all enclosed in a high density polyethylene tube, intended for underground installation in accordance with Article 343 of the National Electrical Code (NEC), or for high-way lighting, utility company installations and similar uses not within the scope of the NEC.

The product is intended for embedment in concrete and/or for direct burial in the earth to a depth specified in the NEC; or by the acceptance authority.

The product is provided in a continuous length on a reel and it is to be installed without splices underground. The ends of cable runs are to be stubbed-up through concrete or directly from earth into equipment enclosures, cabinets or lighting pole bases.

Conductors in the cable are rated 600 V or higher and are suitable for use in wet and dry locations. The conductors fill the internal cross section of the tube in accordance with Chapter 9 of the NEC.

For cables rated 600 V through 35 KV, the voltage ratings of all conductors in a construction are the same. The ampacity of the conductors is to be determined on the basis of the AWG size, the temperature ratings of the conductors, and the number of current carrying conductors in the cable, in accordance with the NEC.

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The smallest radius to which the cable may be bent in the installation is:

Trade Size In.	Min Bending Radius In.
1/2	10
3/4	12
1	14
1-1/4	18
1-1/2	20
2	26
2-1/2	36
3	48
4	60

The range of trade sizes is from 1/2 in. to 4 in. incl.

For product intended for use in accordance with the NEC, a marking, "For Use In Accordance With Article 343, NEC" is located on the reel and on the surface of the cable.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Preamsembled Cable in Nonmetallic Conduit", "Nonmetallic Underground Conduit With Conductors", or other appropriate product name.

PREFABRICATED ASSEMBLIES (QQRX)

Prefabricated assemblies are factory-built assemblies incorporating pre-installed materials and equipment which after installation are usually concealed and may not be accessible for inspection at the installation site.

Materials, including the methods used for the installation of electrical, mechanical, heating and plumbing equipment incorporated in these assemblies by their manufacturer have been judged under the requirements of the Laboratories which are based on the National Electrical Code, National Fire Code and Model Building, Plumbing and Mechanical Codes.

These prefabricated assemblies are intended for installation subject to approval by the authority having jurisdiction.

For factory-built buildings see "Prefabricated Buildings" in the Building Materials Directory.

KITCHEN UNITS, NONREFRIGERATED (QQTX)

This listing covers kitchen units consisting of various combinations of nonrefrigerated major appliances assembled in a frame which may or may not include kitchen utility equipment.

Examples of major appliances would be ranges, ovens, dryers, washers, etc. The appliances may be prewired to a provided distribution panel or the appliances may be provided with separate connection provisions.

For combination of major appliances which include refrigerators, see listings under "Kitchen Units, Refrigerated."

The appliances for separate installation are indicated in the individual listings.

The basic standard used to investigate products in this category is NFPA 70.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonrefrigerated Kitchen Unit".

MANUFACTURED WIRING SYSTEMS (QQVX)

These are factory-built modules and cable sets incorporating fixtures, switches, connectors and receptacles.

These prefabricated modules and assemblies are intended for installation rearrangement and inspection in accessible locations in accordance with Article 604 of the National Electrical Code and are subject to approval by the authority having jurisdiction.

Components of manufactured wiring systems may be marked: "Acceptable for use in ducts or plenums" or equivalent wording, or may be marked: "Acceptable for use in air-handling spaces other than ducts or plenums" or equivalent wording.

Assemblies of manufactured wiring systems suitable for use in outdoor locations are marked "Outdoor".

The basic standard used to investigate products in this category is UL183, "Manufactured Wiring Systems."

**2003 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY 97**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Distribution Box", "Tap Box", or other appropriate product name as shown in the individual Listing.

PREFABRICATED ASSEMBLIES, SECTIONS AND UNITS (QQXX)

USE

Prefabricated sections or units are factory-built assemblies for use in, within, or as part of the structure of buildings for commercial, industrial, and residential use. These assemblies may incorporate pre-installed materials and equipment which are usually concealed and may not be accessible for inspection at the installation site.

These assemblies are intended for installation subject to approval by the Authority having jurisdiction.

INSTALLATION CODES

Materials, including the methods used for the installation of electrical, mechanical, heating, and plumbing equipment included in these assemblies by the manufacturer of the assemblies, have been judged under UL requirements which are based on the National Electrical Code, National Fire Code, and Model Building, Plumbing and Mechanical Codes.

RATINGS

The fire hazard of building materials employed in the assemblies is judged to be no greater than that of ordinary lumber used in site-constructed buildings. Finish surfaces are of materials having flame spread and smoke developed rating of 200 or less. Products with a rating less than 200 as indicated in the individual listings may be included as part of the product marking.

Structural requirements vary with type of building construction and occupancy, and stability is to a large measure dependent upon the attachment of the assemblies to field-erected or existing structures. Therefore, local inspection authorities should be consulted with respect to local requirements and the method to be employed to effect and determine compliance therewith.

REQUIREMENTS

The basic requirements used to investigate products in this category is the National Electrical Code, NFPA 70.

For additional information, see Electrical Equipment for use in Ordinary Locations (AALZ) and Prefabricated Assemblies (QQRX).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product names "Prefabricated." +

+The Listing Mark will indicate the specific type of assembly, such as "Dental Unit" with further description where necessary.

One Listing Mark is applied to each section or unit.

WIRING ASSEMBLIES (QQYZ)

This Listing covers fabricated wiring assemblies, wiring assembly kits, conduit kits, and surface raceway kits. For products covered by Article 604 of The National Electrical Code, see the category Manufactured Wiring Systems (QQVX).

Factory assembled wiring assemblies incorporate Listed or Recognized Component conduit, tubing, or cable, conductors, and fittings, that are intended for field installation in accordance with the National Electrical Code. They may be factory assembled to outlet or junction boxes, box mounting brackets, and wiring devices.

Factory assembled wiring assemblies are marked with the conduit, tubing, or cable type and with the conductor size and type to permit determination of their suitability for a specific application and ampacity in accordance with the National Electrical Code. A parts list is provided with each assembly to identify the extent of the product.

Wiring assembly kits for final assembly in the field consist of a package, which contains some or all: length(s) of Listed conduit, tubing, or cable, Listed fittings, appropriate for the type of conduit, tubing, or cable, outlet or junction boxes, conductors, or other devices.

The packaging for wiring assembly kits is marked with the conduit, tubing, or cable size and type, and the conductor size and type, if provided, to permit determination of their suitability for a specific application and ampacity in accordance with the National Electrical Code. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the authority having jurisdiction.

Conduit kits for final assembly in the field consist of a package, which contains some or all: length(s) of Listed conduit or tubing, Listed fittings appropriate for the type of conduit or tubing, outlet or junction boxes, or other devices.

The packaging for conduit kits is marked with the conduit or tubing size and type to permit determination of their suitability for a specific application in accordance with the National Electrical Code. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the authority having jurisdiction.

Surface raceway kits for final assembly in the field consist of a package, which contains some or all: length(s) of Listed surface metal or nonmetallic surface raceway, Listed fittings appropriate for the surface raceway, or other devices.

The packaging for surface raceway kits is marked with the raceway size and the number, type and size of conductors which may be installed in the Listed raceway, to permit determination of its suitability for a specific application in accordance with the National Electrical Code. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the authority having jurisdiction.

The Listing Mark of Underwriters Laboratories Inc. on the factory assembled wiring assembly or the packaging of a wiring assembly kit is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction to the Directory), together with the word "LISTED", a control number and the following product name: "Wiring Assembly", "Wiring Assembly Kit", "Conduit Kit" or "Surface Raceway Kit".

PRESS AND OTHER POWER OPERATED MACHINE CONTROLS AND SYSTEMS (QUEQ)

These Controls and systems are intended for industrial or commercial application on power operated machines intended for such uses as pressing, punching, shearing or breaking operations. They may be designed for use on particular types of equipment such as pneumatic or hydraulic powered devices or mechanically operated part or full revolution types of machines. The control or system is intended to reduce the risk of bodily injury resulting from machine operation. The intended use of the control is noted in the individual Listings.

The controls or systems have been investigated in accordance with the requirements of the National Fire Protection Association Electrical Standard for Industrial Machinery NFPA 79, and Article 670 of the National Electrical Code.

PRESENCE SENSING DEVICES (QUHP)

A presence sensing device is intended for use in a machine control system where it can be interconnected to the control system. The presence sensing device detects the presence of an object or body part and is used as a guard to prevent bodily injury from moving machine parts. The product is limited to use on part revolution types of machines or machines where operation can be interrupted and motion stopped at any point in the machine operation cycle.

Presence sensing devices evaluated for press initiation are noted in the individual Listings. Presence sensing devices evaluated for press initiation are intended to be in accordance with the Occupational Safety and Health Administration Standard Section 1910.217 (11)(A).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction to this Directory) together with the word "LISTED", a control number and the Product name "Presence Sensing Device".

PRESS CONTROLS (QUKQ)

A press control is a device intended for use in a press control system where it would be interconnected with other components such as push button hand controls, valves, air cylinders, etc. When the press control or system is applied as intended, it is judged to be in accordance with Occupational Safety and Health Administration Standard Section 1910.217.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as

illustrated in the introduction to this Directory) together with the word "LISTED", a control number and the Product name "Press Control".

PROCESS CONTROL EQUIPMENT (QUXY)

GENERAL

This category covers process control equipment rated 600 V maximum for use in accordance with NFPA 70, "National Electrical Code." This equipment includes instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used therewith such as sensors, transducers and valve operations.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

Equipment intended to be installed only in process control panels is so identified.

Process control equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with provided installation instructions.

Open-type process control equipment is not provided with a complete enclosure and is intended to be placed in a industrial control panel or similar type of enclosure.

RELATED PRODUCTS

Process control equipment intended to be mounted in hazardous (classified) locations or that has circuits which extend into hazardous locations is covered in the Hazardous Locations Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Process Control Equipment," "Open-Type Process Control Equipment," "Process Control Enclosure," "Process Control Enclosure Part," "Process Control Subassembly" or "Process Control Accessory."

When shape or size of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, "QUXY" and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

PROCESS CONTROL EQUIPMENT, ELECTRICAL (QUYX)

This category covers process control equipment for ordinary locations in accordance with the National Electrical Code and is rated 600 v maximum.

The products covered in this category include instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used therewith such as sensors, transducers and valve operations.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

Equipment intended to be installed only in process control panels is so identified.

Process control equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with provided installation instructions.

Open-type process control equipment is not provided with a complete enclosure and is intended to be placed in an industrial control panel or similar type of enclosure.

Process control equipment that is to be mounted in hazardous locations or has circuits which extend into hazardous locations are Listed in the Hazardous Location Equipment Directory.

The basic standard used to investigate products in this category is UL3121-1, "Process Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol of Underwriters Laboratories Inc. (as illustrated in

the Introduction of this Directory) together with the word "LISTED", a control number and the product name: "Process Control Equipment", "Open-Type Process Control Equipment", "Process Control Enclosures", "Process Control Enclosure Part", "Process Control Subassembly", or "Process Control Accessory". When shape or size of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, QUXX, and the control number provided that the complete Listing Mark text appears on the smallest shipping container.

QUICK CONNECT TERMINALS (RFWV)

GENERAL

This category covers quick connect tabs and quick connect connectors constructed from plain or plated copper alloy or of nickel or nickel alloy, herein referred to as quick connect terminals. They are additionally defined as follows:

Quick Connect Wiring Termination — An electrical connection consisting of a male tab and a female connector (receptor) that can be readily engaged or disengaged without the use of a tool.

Terminal — An electrical connecting device consisting of either a connector or tab.

Tab — A terminal that is inserted in a connector, manufactured to specified tolerances, and intended to mate with a connector to establish a connection in an electrical circuit.

Connector — A terminal that is pushed onto a tab.

Quick connect terminals are intended for use with one or two copper conductors, 22 – 10 AWG. Ampacity for a two-wire combination is limited to the current associated with the largest of the two conductors.

Quick connect terminals are not intended for disconnecting under load.

PRODUCT MARKINGS

Cartons containing quick connect terminals are marked to indicate whether the tab or connector is suitable for the internal wiring of appliances, for field termination of conductors to electrical equipment, or for both.

Cartons containing quick connect terminals are marked to indicate their suitability for termination of copper wire only.

Cartons containing quick connect terminals designed for the field termination of conductors to electrical equipment are marked to indicate that such electrical equipment is to be provided with strain relief and is to be marked with instructions for effecting the strain relief and also reference the specific mating part (tab or connector) to be used.

Cartons containing insulated quick connect terminals are marked with a voltage rating and the maximum operating temperature for which they have been found acceptable. The marked voltage rating may be 300 V maximum; 600 V maximum; or 600 V maximum building wire, 1000 V maximum signs or luminaires. An insulated terminal is additionally marked with the maximum operating temperature.

Quick connect terminals to be assembled to wire using a special tool are intended to be assembled using the tool specified by the manufacturer on or in the shipping carton. Such tools are identified by appropriate marking.

RELATED PRODUCTS

Quick connect tabs or connectors constructed from plated steel, or unplated steel of a corrosion-resistant alloy are covered under Quick Connect Terminals (RFWV2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 310, "Electrical Quick-Connect Terminals".

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Quick Connect Tab" or "Quick Connect Connector" or other appropriate product name as shown in the individual Listings.

RACEWAYS (RGKT)

This Listing covers the following products:
Cellular Concrete Floor Raceways and Fittings
Cellular Metal Floor Raceways and Fittings
Surface Metal Raceways and Fittings

Surface Nonmetallic Raceways and Fittings
Underfloor Raceways and Fittings

Metallic raceways and associated fittings installed in accordance with the product markings and manufacturer's instructions are suitable for use as equipment grounding conductors.

CELLULAR CONCRETE FLOOR RACEWAYS (RGYR)

Listed cellular concrete floor raceways have Fire Resistance Ratings, as used in building construction, only when assembled in the manner described in the Designs covered in the Fire Resistance Directory, Classification Precast Concrete Units (Guide CFTV). Where header ducts and junction boxes are involved these items must be shown in the Design drawing in order that the associated Fire Resistance Rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Concrete Floor Raceway".

Cellular Concrete Floor Raceway Fittings (RHLZ)

The basic standard used to investigate products in this category is UL209, "Cellular Metal Floor Electrical Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Cellular Concrete Floor Raceway Fitting", "End Closure", "Wall Elbow", or other appropriate product name.

CELLULAR METAL FLOOR RACEWAYS (RHZX)

This category covers cellular metal floor raceway intended to enclose electrical conductors. It is intended to be installed in accordance with Article 356 of the National Electrical Code.

The raceway may consist of factory constructed raceway or field assembled components forming a raceway. Each component of a field assembled raceway is marked to identify its relation to the other components of the raceway.

Listed cellular metal floor raceways have Fire Resistance Ratings, as used in building construction, only when assembled in the manner described in the Designs covered in the Fire Resistance Directory, Classification Steel Floor and Form Units (Guide CHWX). Where header ducts and junction boxes are involved, these items must be shown in the Design drawing in order that the associated Fire Resistance Rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

The basic standard used to investigate products in this category is UL209, "Cellular Metal Floor Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Metal Floor Raceway", "Cellular Metal Floor Raceway Bottom", "Cellular Metal Floor Raceway Cover Plate For Use With Listed Raceway Bottom", or other appropriate product name.

CELLULAR METAL FLOOR RACEWAY FITTINGS (RINV)

The basic standard used to investigate products in this category is UL209, "Cellular Metal Floor Electrical Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing

ing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Cellular Metal Floor Raceway Fitting", "End Closure", "Grommet", or other appropriate product name.

STRUT-TYPE CHANNEL RACEWAYS (RIUU)

USE

This category covers strut-type channel raceways for installation in dry locations only in accordance with NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

Raceways for use with lighting fixtures and/or other devices are marked to this effect on the raceway or on the package in which it is shipped.

The Listing Mark is applied to each length or package of complete raceway, raceway closure strip (cover) or raceway base.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 5B, "Strut-Type Channel Raceways and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Strut-Type Channel Raceway," "Strut-Type Channel Raceway Base" or "Strut-Type Channel Raceway Closure Strip."

Fittings for Strut-type Channel Raceways (RIYG)

This category includes fittings, such as adapters, boxes, elbows and tees for use with the same manufacturers strut-type channel raceways.

The basic requirements used to investigate products in this category are contained in Proposed Standard UL 5B, "Strut-Type Channel Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Strut-Type Channel Raceway Fitting", "Elbow", "Tee", or other appropriate product name.

SURFACE METAL RACEWAYS (RJBT)

USE

This category covers surface metal raceways for installation in accordance with NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

Raceways for use with lighting fixtures and/or other devices are marked to this effect on the raceway or on the package in which it is shipped.

The Listing Mark is applied to each length or package of complete raceway, raceway cover or raceway base.

RELATED PRODUCTS

Some lighting fixtures covered under the categories of Fixtures and Recessed Type Fixtures are suitable for use as raceways.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 5, "Surface Metal Raceways and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Surface Metal Raceways," "Surface Metal Raceway Base For Use With Labeled Raceway Cover" or "Surface Metal Raceway Cover For Use With Labeled Raceway Base."

Surface Metal Raceway Fittings (RJPR)

The basic standard used to investigate products in this category is UL5, "Surface Metal Electrical Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Surface Metal Raceways Fitting", "Hanger", "Side Feed", or other appropriate product name.

SURFACE NONMETALLIC RACEWAYS (RJTX)

USE

This category covers surface nonmetallic raceways for installation in accordance with NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

The Listing Mark is applied to each length or package of complete raceway, raceway cover or raceway base.

RELATED PRODUCTS

Some lighting fixtures covered under the categories of Fixtures and Recessed Type Fixtures are suitable for use as raceways.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Surface Nonmetallic Raceway," "Surface Nonmetallic Raceway Base for Use with Labeled Raceway Cover" or "Surface Nonmetallic Raceway Cover for Use with Labeled Raceway Base."

Surface Nonmetallic Raceway Fittings (RJYT)

The basic standard used to investigate products in this category is UL5A, "Nonmetallic Surface Raceways and Fittings."

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Surface Nonmetallic Raceway Fitting," "Butt Joint Cover," "End Cap" or other appropriate product name.

SURFACE RACEWAYS AND FITTINGS CLASSIFIED FOR USE WITH SPECIFIED PRODUCTS (RKAW)

This category covers surface metal or nonmetallic raceways and fittings Classified for use with specific Listed surface metal or nonmetallic raceways and fittings, in accordance with the details described in the Classification Marking.

The basic Standard used to investigate products in the category is UL 5, "Surface Metal Raceways and Fittings."

Products Classified under this category are also Listed under the appropriate category: "Surface Metal Raceways, or Surface Nonmetallic Raceways" or the associated fittings.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the appropriate Listing Mark and the statement: "Also Classified by Underwriters Laboratories Inc. for use with _____ UL Listed (Model) (Cat) No. *, manufactured by _____".

*Surface Metal Raceway Cover, Surface Metal Raceway Base, Surface Nonmetallic Raceway Cover, Surface Nonmetallic Raceway Base, or other appropriate product name.

UNDERFLOOR RACEWAYS (RKCZ)

This category covers metal underfloor duct systems designed for use as raceways for the installation of wires and cables in accordance with Article 354 of the National Electrical Code and the manufacturer's installation instructions.

The raceway may consist of factory constructed raceways or field assembled components forming a raceway. Each component is provided with installation instructions to identify its relation to the other components of the raceway.

The basic standard used to investigate products in this category is UL884, "Underfloor Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name "Underfloor Raceway".

Underfloor Raceway Fittings (RKQX)

This category covers underfloor raceway fittings for installation in underfloor raceway systems in accordance with Article 354 of the National Electrical Code and the manufacturer's installation instructions.

Each component is provided with installation instructions to identify its relation to the other components of the raceway system.

The basic standard used to investigate products in this category is UL884, "Underfloor Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Underfloor Raceway Fitting", "Raceway Adapter", "Saddle Support", or other appropriate product name as shown in the individual Listing.

UNDERPLASTER RACEWAYS (RLEV)

The basic standard used to investigate products in this category is UL5, "Surface Metal Electrical Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Underplaster Raceway".

Underplaster Raceway Fittings (RLST)

The basic standard used to investigate products in this category is UL5, "Surface Metal Electrical Raceways and Fittings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Underplaster Raceway Fitting", "Coupling", "Converter Box", or other appropriate product name.

RAISED FLOOR WIREWAYS (RQFW)

This Listing covers Raised Floor Wireways which are an integral part of the raised floor used in computer rooms. These wireways are for installation in accordance with Articles 362 and 645 of the National Electrical Code and the manufacturer's installation instructions.

The basic Standards used to investigate products in this category are UL 870, Wireways, Auxiliary Gutters and Associated Fittings and ANSI/NFPA 75-1981, Standard for the Protection of Computer/Data Processing Equipment.

Raised floor wireways are of such size that shipment fully assembled is impractical. To supplement the general requirements given in the applicable articles of the National Electrical Code, installation instructions describing or illustrating the proper assembly, mounting, and connection of the parts are required to be provided by the manufacturer. The acceptability of the assembled parts in the field rests with the local authority having jurisdiction.

The Listing Mark will be applied to the cover of the line voltage wireway. Additional markings are provided to clearly indicate the parts which combine to form the complete assembly.

Raised Floor Wireways installed in accordance with the product markings and manufacturer's instructions are suitable for use as equipment grounding conductors.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory), together with the word "Listed," a control number, and the following product name: "Raised Floor Wireway."

RECEPTACLE CLOSURES (RQYF)**GENERAL**

This category covers receptacle closures for use with receptacles of ANSI/NEMA WD6-1997 configurations 1-15R and 5-15R. Receptacle closures are products molded of insulating material that are intended to be used with a receptacle to cover the outlet slots a) to reduce drafts through a receptacle on an outside wall of a dwelling or b) to restrict a child's access to energized contacts.

Receptacle closures that are intended to reduce drafts through a receptacle on an outside wall of a dwelling and that are not intended to restrict a child's access to energized contacts are packaged together with an insulating gasket to be fitted behind the receptacle cover plate. The packaging of such closures are marked to indicate their intended use.

Receptacle closures that are intended to restrict a child's access to energized contacts are not a substitute for adult supervision. The packaging of such closures contains a cautionary marking to this effect.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2255, "Receptacle Closures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Closure" or "Receptacle Closure" or other appropriate product name as shown in the individual Listings.

RECEPTACLES (RTDV)**GENERAL:**

The three sub categories below cover the following attachment plug products:

Receptacles for Attachment Plugs and Plugs
Receptacles, Stage Type
Receptacles with Switch

These listings cover the following types of products:

Appliance, Equipment or Fixture Outlet — A female contact device for mounting on utilization equipment.

Receptacle — A female contact device intended to be installed on a wiring system to supply current to utilization equipment.

These listings may also cover the following types of products of a non-standard configuration blade or slot configuration type which are part of a manufacturer's line of wiring devices including receptacles. Other similar devices are listed under Attachment Plugs (AXGV).

Attachment Plug — A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to a male inlet.

Male Inlet (Equipment Inlet, Motor Attachment Plug) — A male contact device to be mounted on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

These listings do not cover devices to be molded on flexible cord or wire and unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and they are judged as part of a complete assembly.

These listings do not cover pin and sleeve type devices. Refer to the category of Pin and Sleeve Type Plugs, Receptacles and Cable Connectors (QLGD) for further information on these products.

The basic standard used to investigate products in these sub categories is UL 498, "Attachment Plugs and Receptacles".

RATINGS:

These devices are rated 600 volts or less, ac or dc; and 200 amps or less. They may also be rated in horsepower as noted in the individual sub categories.

Devices rated 250 volts are tested on circuits involving a nominal potential to ground of 125 volts. Devices having other voltage ratings are tested on circuits involving full rated potential to ground except for multiphase rated devices which are tested on circuits consistent with their voltage ratings, i.e. a 120/208 volts, 3-phase, devices is tested on a circuit involving 120 volts to ground.

Devices marked "Not for current interruption" are not intended to be disconnected while under load. They are to be installed in series with switches or other appropriate disconnecting means.

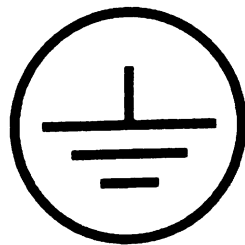
TERMINALS:

The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the National Electrical Code. The ampacity of the flexible cords and cables is based on Section 400-5, tables 400-5(A) and 400-5(B). The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. The terminations are based on the use of 60°C flexible cord or cable.

Unless state otherwise in the sub categories below, the termination provisions of all other devices are based upon the use of 60°C insulated conductors in circuits rated 100 amps or less, and the use of 75°C insulated conductors in circuits rated more than 100 amps, as specified in Table 310-16 of the National Electrical Code.

GROUNDING:

Devices having a terminal identified by a green colored finish, the words "green" or "ground", or the letters "G" or "GR", or the symbol are



grounding types. The blade, pin or contact member connected to this terminal is for equipment grounding only.

ENCLOSURES:

In general, devices having integral enclosures or installed as intended have been investigated for use indoors, in dry locations. All such Listed products provide a degree of protection against ordinary corrosion, accidental contact with live parts, and a limited amount of falling dirt. Some devices have been evaluated for use in other operating environments when unmated and when mated with other devices in the same manufacturer's line of products. They are marked with one of the type designations 2 through 6, 12 and 13 indicated in the guide for Equipment for Use in Ordinary Locations (AALZ) at the beginning of this directory. All outdoor types provide a degree of protection against rain, snow, and sleet. Outdoor types are also suitable for use indoors if they meet the environmental conditions present. A device that complies with the requirements for more than one type of enclosure may be marked with multiple designations. Complete use and mating information is provided in the installation instructions provided with each device.

WET AND DAMP LOCATIONS:

Receptacles provided with integral outlet box covers or flush device cover plates may be identified for use in damp or wet locations as defined in the National Electrical Code. If the cover provides protection only when it is closed, the combination is marked "Wet Location When Cover Closed" and may be marked "Damp Location".

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS (RTRT)

GENERAL

This category covers general use receptacles for use in wiring systems recognized by NFPA 70, "National Electrical Code" (NEC), and outlets for use in appliances and fixtures. It also covers some attachment plugs, male inlets, and cord connectors with non-standard slot or blade configurations which are part of a line of wiring devices including receptacles. Other similar attachment plug devices are covered under Attachment Plugs (AXGV).

PRODUCT TYPES

Flush Receptacles — Flush receptacles are intended for mounting in or on an outlet box, an outlet box cover or a flush device cover plate for fixed installation on a branch circuit. They are not intended to be field mounted on outlet box covers solely by the center cover plate screw. They may be employed in damp and wet locations when installed in an appropriate enclosure. See Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ) for information on outlet boxes and covers suitable for use in damp and wet locations.

Self-grounding Receptacles — Self-grounding receptacles have special integral means for establishing the grounding circuit between device yokes and (1) the grounded metallic flush-type boxes, or (2) the grounded nonmetallic flush device boxes employing a grounding strap and terminal; without the use of bonding jumpers as permitted by Section 250.146(B) (formerly Exception No. 2 to Section 250-74) of the NEC. These devices are identified by the statement: "This receptacle is Listed by Underwriters Laboratories Inc. and has a special pressure spring clip to establish the grounding circuit between device yokes and (1) the grounded metallic flush-type boxes, or (2) the grounded nonmetallic flush device boxes employing a grounding strap and terminal; without the use of bonding jumpers as permitted by Section 250.146(B) of the National Electrical Code" (or equivalent wording) which may appear on the device or shipping carton.

Isolated Ground Receptacles — Grounding-type receptacles in which the grounding terminals are purposely insulated from the mounting means of receptacles and associated metal cover plates as permitted by Section 250.146(D) (formerly Exception No. 4 to Section 250-74) of the NEC are so identified by an orange triangle marked on the face of the receptacle.

Receptacles for Use in Hospitals — Receptacles for hospital use in other than hazardous (classified) locations in accordance with Article 517 of the NEC are identified (1) by the marking "Hospital Only" (used to identify a specific grounding locking configuration rated 20 A, 125 V used for the connection of mobile x-ray and similar equipment) or (2) by the marking "Hospital Grade" and a green dot on the face of the receptacle. The identification is visible during installation on the wiring system or, in the case of the appliance outlet, after installation on the utilization equipment.

Tamper Resistant Receptacles — Receptacles for use in pediatric patient care areas in accordance with Article 517 of the NEC are identified by the words "Tamper Resistant" or the letters "TR" where they will be visible after installation with the cover plate removed. Tamper-resistant receptacles may be of the general grade, hospital grade or isolated ground type.

Self-contained Receptacles — Self-contained receptacles include an enclosure and mounting means intended for flush mounting without the use of a separate flush device or other outlet box. They are intended for use with Types NM and NMC cable in accordance with the NEC, specifically Sections 300.15(E), 334.40(C), 545.10, 550.15(I), 551.47(E) Exception No. 1 and 552.48(E) Exception No. 1 and are so identified by specific marking on the carton in which they are packed. Devices employing insulation displacement terminals are intended for assembly with specific installation tools only. Reference must be made to the installation instructions regarding the proper tool and the number of cables (per entry) with which the devices are intended to be used.

Surface Receptacles — Surface receptacles include an enclosure and mounting means for surface mounting without the use of a separate outlet box. They are intended for connection to exposed nonmetallic-sheathed cable as permitted by Article 336 of the NEC. Some may also accept other wiring systems. Surface receptacles rated 50 A that employ enclosures of insulating materials are not intended for use in applications where they are likely to be subject to severe mechanical abuse.

Display Receptacles — Display receptacles are provided with a flush device cover plate or outlet box cover and closure plug or plugs. They are intended for use in show window floors and similar locations where the device is not likely to be subjected to scrub water. They are not intended to be used as substitutes for floor boxes, which are covered under Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ).

Interchangeable (Modular) Receptacles — Interchangeable receptacles are flush receptacles that are assembled as single, duplex or triplex outlets in the field from a system of individual outlet modules, mounting yokes, and/or flush device cover plates.

Appliance, Equipment and Fixture Outlets — When an outlet is installed in equipment with a conductive mounting surface, the face of the receptacle shall project a minimum of 3/32 in. and a maximum of 3/16 in. from the mounting surface.

Federal Specification — Some receptacles in this category have been investigated for compliance with Federal Specification W-C-596, "General Specification for Electrical Power Connectors." Such devices are identified by a Listing Mark augmented by the capital letters "F" and "S" each in a wing on either side of the UL Mark. The manufacturer may also include the Federal Specification number "W-C-596F" or "W-C-596G" or the Federal Specification part number (which consists of the appropriate specification sheet and dash number described in the specification) on the device or on the smallest container in which the device is packaged.

TERMINALS

Terminals of 15 A and 20 A receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

2003 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

Terminals of receptacles rated 30 A and above not marked "AL-CU" are for use with copper conductors only. Terminals of receptacles rated 30 A and above marked "AL-CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals marked "75 C" may be wired using the ampacities for conductors rated 75°C as well as conductors rated 60°C in Table 310.16 of the NEC.

Terminals of the wire-binding screw, setscrew, or screw-actuated back wired clamping types are suitable for use with both solid and stranded building wires.

Screwless terminal connectors of the conductor push-in type (also known as "push-in-terminals") are restricted to 15 A branch circuits and are for connection with 14 AWG solid copper wire only. They are not intended for use with aluminum or copper-clad aluminum wire, 14 AWG stranded copper wire, or 12 AWG solid or stranded copper wire.

Single and duplex receptacles rated 15 A and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors may be used to feed a single set of branch circuit conductors connected to other receptacles on a multi-outlet branch circuit. These devices have not been tested for tapping off more than one circuit from the receptacle by utilizing both the side-wiring and back-wiring terminals on an outlet.

Duplex receptacles rated 15 A and 20 A that are provided with break off tabs may have those tabs removed so that the two receptacles may be wired in a multi-wire branch circuit.

HORSEPOWER RATINGS

In addition to ampere and voltage ratings, standard AC horsepower ratings corresponding to the ampere and voltage ratings for specific general-use receptacles not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use a receptacle having a horsepower rating not less than 1.4 times the standard AC horsepower rating. The NEMA configuration designation is included for reference. Devices of configurations other than those indicated in the table have horsepower ratings only if such ratings are marked on the device.

HORSEPOWER RATINGS FOR NEMA CONFIGURATION RECEPTACLES

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
15	125	1	2	2	1-15, L1-15	1/2
	125	1	2	3	5-15, L5-15	1/2
	250	1	2	2	2-15	1-1/2#
	250	1	2	3	6-15, L6-15	1-1/2#
	277	1	2	3	7-15, L7-15	2
	125/250	1	3	4	14-15	1-1/2
					L-L#, 1/2	
					L-N	
	250	3	3	3	11-15, L11-15	2
	250	3	3	4	15-15	2
20	120/208	3	4	4	18-15	2
	125	1	2	3	5-20, L5-20	1
	250	1	2	2	2-20, L2-20	2#
	250	1	2	3	6-20, L6-20	2#
	277	1	2	3	7-20, L7-20	2
	480	1	2	3	L8-20	3
	125/250	1	3	3	10-20, L10-20	2 L-L#, 1 L-N
	125/250	1	3	4	14-20, L14-20	2 L-L#, 1 L-N
	250	3	3	3	11-20, L11-20	3
	250	3	3	4	15-20, L15-20	3
20	480	3	3	3	L12-20	5
	480	3	3	4	L16-20	5
	120/208	3	4	4	18-20, L18-20	2
	120/208	3	4	5	L21-20	2
	277/480	3	4	4	L19-20	5
	277/480	3	4	5	L22-20	5
	125	1	2	3	5-30, L5-30	2
	250	1	2	2	2-30	2#
	250	1	2	3	6-30, L6-30	2#
	277	1	2	3	7-30, L7-30	3
30	480	1	2	3	L8-30	5
	125/250	1	3	3	10-30, L10-30	2 L-L#, 2 L-N
	125/250	1	3	4	14-30, L14-30	2 L-L#, 2 L-N
	250	3	3	3	11-30, L11-30	3
	250	3	3	4	15-30, L15-30	3

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ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY 103

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
50	480	3	3	3	L12-30	10
	480	3	3	4	L16-30	10
	120/208	3	4	4	18-30, L18-30	3
	120/208	3	4	5	L21-30	3
	277/480	3	4	4	L19-30	10
	277/480	3	4	5	L22-30	10
	125	1	2	3	5-50	2
	250	1	2	3	6-50	3#
	277	1	2	3	7-50	5
	125/250	1	3	3	10-50	3 L-L#, 2 L-N
60	125/250	1	3	4	14-50	3 L-L#, 2 L-N
	250	3	3	3	11-50	7-1/2
	250	3	3	4	15-50	7-1/2
	120/208	3	4	4	18-50	7-1/2
	125/250	1	3	4	14-60	3 L-L#, 2 L-N
	250	3	3	4	15-60	10
	120/208	3	4	4	18-60	7-1/2

#L-L: Motor connected line-to-line.

L-N: Motor connected line-to-neutral.

##Also suitable for 208 V motor applications at the indicated horsepower rating.

For three phase devices, the horsepower ratings indicated are for three phase motor loads.

Refer to ANSI/NEMA WD6-1997 for configurations of the NEMA designations.

ADDITIONAL INFORMATION

For additional information, see Receptacles (RTDV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Attachment Plug," "Plug," "Receptacle," "Recept," "Attachment Plug With Overload Protection," "Attachment Plug Fuseless" or other appropriate product name as shown in the individual Listings.

RECEPTACLES, STAGE TYPE (RUFR)

This listing covers attachment plugs, cord connectors, equipment outlets, male inlets and receptacles intended for use in theater and stage applications in accordance with Articles 520 and 530 of the National Electrical Code.

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits, or on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Plug", "Connector", "Stage Type Plug", "Stage Type Connector" or other appropriate product name.

RECEPTACLES WITH SWITCH (RUSZ)

This listing covers receptacles and appliance outlets incorporating switches.

In addition to UL 498, the standard used to investigate products in this category is UL 20, "General Use Snap Switches". For additional information, see the general guide information under Snap Switches (WJQR).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED" (or "LIST.")

UTILITY SERVICE RECEPTACLES (RVNW)

The products covered in this category are Utility Service Receptacles having a unique, non-standard contact configuration and utilizing the grounded neutral conductor of the supply as the equipment grounding conductor.

These receptacles are intended for mounting in a utility pole and for use in conjunction with a Utility Service Cord Set (see Guide ELFT) only by authorized utility company personnel in obtaining temporary power from utility poles. They are rated as marked, for example 125 volts, 15 amperes.

These receptacles were investigated in accordance with the requirements for Attachment Plugs and Receptacles (UL 498) with regard to protection from the risk of electrical shock and the ability to function without overheating.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

Utility Service Receptacles
Classified by
Underwriters Laboratories Inc.
as to Protection from Electric Shock
and Ability to Function Without Overheating.

REPACKAGED ELECTRICAL CONSTRUCTION EQUIPMENT (TEOZ)

Products covered under this category are repackaged Listed or Classified products of the type contained in the Electrical Construction Equipment Directory.

Required user instructions and ratings are marked or packaged with the smallest unit container in which the product is packaged.

Listed wire or cable that has been subjected to processing or respooling subsequent to its manufacture is covered under "Wire, Processed" (ZKLU).

Lightning Protection Installation (OWAY) are covered by UL's Master Label service and are not eligible for Repackaging. Lightning Conductor, Air Terminals and Fittings (ÖVTZ) are intended for installation in a Listed Lightning Protection Installation and are not eligible for Repackaging.

Products that are covered by "Listing by Report" may require special descriptions and recommended methods of installation and are not covered under this category.

The Listing Mark or Classification Marking of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing or Classification and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory), together with the word "LISTED", a control number and the appropriate product name. The Classification Marking for these products consists of the Classification Marking (and any rating or design information required as part of the Classification Marking) provided by the original manufacturer of the Classified product and a control number. The Classification Marking may include the symbol UL in a circle in conjunction with the word "CLASSIFIED".

RESIDENTIAL AND NON-INDUSTRIAL CLOSED-LOOP AND PROGRAMMED POWER DISTRIBUTION EQUIPMENT (TESG)

This category covers equipment for use in closed loop and programmed power distribution systems in accordance with Article 780 of the National Electrical Code. The category also covers basic system products that allow for the future expansion of the distribution system to include the programmed power or closed loop functions. These systems incorporate or are adaptable to a whole building control/signal network for the coordination and supervision of electrical energy distribution.

In the closed loop system, the energy outlet is normally de-energized. When an appliance is connected to the system and requests energy by way of a signal in the control/signal network, the system controller energizes the specific outlet. The system controller continually monitors the circuit for performance and energy use. When the appliance is no longer in use or the controller detects operation not in accordance with specifications, the controlling equipment de-energizes the outlet.

The programmed power distribution system is similar to the closed loop system except that not all of the energy outlets are under the supervision of the system controller. Instead, the system can only supervise those outlets provided with a programmable fitting. Dependent on the particular system, the controller may only supervise the "on" and "off" times of the outlet when an appliance is connected and not continually monitor other characteristics of the appliance or circuit.

The basic system may not include a system controller and does not provide for the supervision of any energy outlets. This system is adaptable, in stages, as determined by the builder or building owner, to a programmed power or closed loop distribution system.

In all systems, the entire system, including conventional, nonprogrammable outlets, basic system products and closed loop and programmed power distribution systems are intended to be provided with branch circuit overcurrent protection in accordance with the National Electrical Code.

This category covers all products for use in closed loop and programmed power distribution systems. These include, but are not limited to utility metering equipment, service equipment, attachment plugs and receptacles, system control equipment, switches and sensors, hybrid branch cable and electrical appliance and utilization equipment.

Equipment, appliances and related cable and wiring usable in closed loop and programmed power distribution systems but not specifically designed for it are covered under the appropriate individual categories.

The hybrid branch cable contains branch circuit power conductors and signaling conductors under a common jacket. The branch circuit conductors are size No. 14 or 12 AWG copper and are rated 600 V with 90 C insulation. The ampacities of the branch circuit conductors are those of 60 C conductors as specified in Article 310 of the National Electrical Code. The signaling conductors are size No. 20 or 24 AWG and have 90 C insulation. The branch circuit conductors have an inner jacket which separates them from the signaling conductors.

Hybrid branch cable is intended to be installed in accordance with Article 336 of the National Electrical Code. Listed nonmetallic sheathed cable connectors for use in a 3/4 in. trade size knockout are suitable for connecting the hybrid branch cable to the service center cable manager. Other connections are to be made in accordance with installation instructions accompanying the product.

The basic Standards used to evaluate hybrid branch cable are UL 719, Nonmetallic-Sheathed Cables, for the branch circuit conductors, and UL 13, Power Limited Circuit Cables, for the signaling conductors.

The Listing Mark of Underwriters Laboratories Inc. on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, the product identifier "Closed-Loop and Programmed Power Distribution Equipment" and one of the following product names as appropriate: "Hybrid Branch Cable", "Hybrid Branch Cable Tap", "Fixture Dimmer Block", "Service Center Cable Manager", "Duplex Receptacles", "Face Plate", or the name of the specific type of product as shown in the individual Listings.

ROBOTS AND ROBOTIC EQUIPMENT (TETZ)

This category covers robots, integrated work cells, programmable production equipment, remote sensing equipment, robotic servo power supplies, and similar equipment.

This equipment has been investigated with respect to risks of electric shock, fire and injury to persons.

The basic standard used to investigate products in this category is UL 1740, "Robots and Robotic Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Robot" or appropriate product name as shown in the individual Listing.

ROSETTES (TNVZ)

ROSETTES, FUSELESS (TOJX)

The basic standard used to investigate products in this category is UL351, "Electrical Rosettes".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Rosette".

SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH)

USE

These categories cover equipment and accessories used in the manufacturing, metrology, assembly and testing of semiconductor products. Equipment intended for both semiconductor product-related use and non-semiconductor product-related use may be included in both these categories, as well as in the applicable non-semiconductor categories. These products do not include equipment intended only for non-semiconductor product-related use.

The accuracy or quality characteristics of any measured, analyzed or prepared quantities have not been evaluated. The sound pressure levels and physiological effects of the RF have not been evaluated.

REQUIREMENTS

This equipment has only been investigated for use in ordinary (unclassified) locations as defined in the National Electrical Code, NFPA 70. Equipment that has been investigated to determine its suitability for use in hazardous (classified) locations as defined in the National Electrical Code may be found in the Hazardous Locations Equipment Directory.

This equipment may also have been investigated by UL using the guideline titled "Safety Guidelines for Semiconductor Manufacturing Equipment," SEMI@S2-XX, where XX is the edition of the Guideline. Such equipment is provided with the supplementary marking "Design evaluated by UL in accordance with Safety Guidelines for Semiconductor Manufacturing Equipment, SEMI@ S2-XX. See accompanying report for details." This marking is located adjacent to the UL Mark.

RELATED PRODUCTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

ANALYSIS AND MEASUREMENT EQUIPMENT (TWLR)

This category covers analysis/measurement equipment and accessories designed for technological activities involving:

- The measurement of physical or chemical properties of materials.
- The measurement of the functional performance of a piece of equipment.
- Qualitative or quantitative constituent analysis of substances.
- Preparation of materials for further analysis or measurements.

Equipment covered by this category includes, but is not limited to, equipment involving:

- Defect Detection Equipment
- Film Thickness Equipment
- Probe Stations
- Surface Inspection/Flatness Equipment

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2011, "Outline of Investigation for Factory Automation Equipment" or UL 3111-1, "Electrical Measuring and Test Equipment, Part 1: General Requirements." Requirements used are indicated in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWLR," and may also include the appropriate product name as shown in the individual Listings.

AUTOMATION AND WAFER HANDLING EQUIPMENT (TWPV)

This category covers automated production equipment, remote sensing equipment, robotic servo power supplies, wafer handling equipment and the like. Equipment covered by this category includes, but is not limited to, equipment involving:

- Wafer Sorters
- Front Opening Universal Ports (FOUP)
- Wafer Transport Systems
- Wafer Loaders
- Standard Mechanical Interfacers (SMIF)
- Other Handling and Transfer Equipment

RELATED PRODUCTS

For apparatus designated as robotic equipment, see Robots and Robotic Equipment (TETZ).

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2011, "Outline of Investigation for Factory Automation Equipment" or UL 3121-1, "Process Control Equipment." Requirements used are indicated in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWPV," and may also include the appropriate product name as shown in the individual Listings.

CONTROL PANELS (TWRF)

USE

The category covers control panels and equipment used to provide power and control to semiconductor process equipment. The Classification Mark for these products covers both the enclosure and the panel provided with it. The panels may be provided with RF power supplies, DC power supplies, control transformers, motor controllers, overload devices, contactors, a main disconnect device and emergency power off (EPO). Semiconductor manufacturing equipment control panels have been classified only as to electrical fire and shock hazards incident to their use in ordinary locations. The compatibility of the panel with the controlled equipment from the standpoint of other potential hazards has not been investigated.

Control panels are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

RELATED PRODUCTS

For industrial control panels for general use, see Industrial Control Panels (NITW) and Industrial Control Equipment (NIMX).

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 508A, "Outline of Investigation for Industrial Control Panels." In addition, the following applicable requirements from SEMI S2-XX are applied, where XX is the issue date of SEMI S2: Safety-related Interlocks, Electrical, Emergency Shutdown, Hazard Warnings, Ergonomics, Seismic, and Documentation.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Control Panel for Semiconductor Manufacturing Equipment" or "Semiconductor Manufacturing Equipment Control Panel," "AS TO FIRE AND ELECTRIC SHOCK ONLY," and a control number.

LIQUID CHEMICAL DISTRIBUTION SYSTEMS (TWSP)

This category covers equipment designed for activities involving control of liquid chemicals used in wafer processing, such as mixing, dispensing, and waste management.

These units may include a complete distribution system consisting of pumps, liquid chemical containing components (tubing, etc.), and associated electrical controls, or modules of such a system.

This equipment is limited to the use of non-flammable liquids. Semiconductor process chemicals present certain inherent hazards. Such inherent hazards such as toxicity have not been investigated. The instructions and warnings supplied with and applicable to each piece of equipment should be carefully observed.

The liquid chemical pumps used in the equipment in this category may be individually covered under the product category Power-Operated Chemical Pumps, RBOG. Listings under (RBOG) cover power-operated pumps intended for liquid transfer or loop systems. Limitations of use, including chemical service and pressure and temperature ratings, are indicated in the individual listings and are marked on the pump.

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This equipment is marked with the following information: "For *, _____ psi max, _____ degree F", where * is the name of the chemical.

See Semiconductor Manufacturing Equipment (TWKH) for additional information.

The basic standard used to investigate products in this category is UL3121-1, Standard for Process Control Equipment.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following category identifiers: "Semiconductor Manufacturing Equip" or "TWSP", and may also include the appropriate product name as shown in the individual listings.

MISCELLANEOUS EQUIPMENT (TWTZ)

This category covers Miscellaneous Equipment not covered in one of the other categories for Semiconductor Manufacturing Equipment.

Equipment covered by this category includes, but is not limited to, equipment involving:

Commercial Processing Water Chillers

Recirculators

Cryopumps & Compressors

Turbo Molecular Pumps

See Semiconductor Manufacturing Equipment (TWKH) for additional information.

The basic standards used to investigate products in this category are as follows: UL471, "Standard for Safety for Commercial Refrigerators and Freezers" and UL1995, "Standard for Safety for Heating and Cooling Equipment". These chillers and recirculators are intended for cooling and tempering water used in semiconductor processing system (PVD, CVD, Etcher, etc.). These units may be provided with a complete refrigeration system (consisting of a hermetic-motor compressor, condenser, evaporator, refrigerant control, electrical controls, wiring and associated refrigerant containing components including tubing) and associated electrical controls and may also incorporate means for heating and circulating water.

Vacuum pumps/accessories, turbo molecular pumps, cryopumps and compressors are investigated to UL 1450, "Standard for Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment." These are pumps intended for use on nominal system voltages of 600 V and less except that where an appliance is driven by an electromagnetic mechanism, the scope is limited to an appliance rated for use on nominal system voltages of 250 V or less. These appliances are cord-connected or provided with means for field wiring connections. Documentation (instructions and warnings) supplied with the equipment identify the evaluated gases.

Other misc. equipment: As indicated in the individual Reports.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following category identifiers: "Semiconductor Manufacturing Equipment" or "TWTZ", and may also include the appropriate product name as shown in the individual listings.

POWER SUPPLIES (TWVJ)

USE

This category covers radio frequency and DC power supplies used to support semiconductor processing. These power supplies may be water cooled.

UNEVALUATED FACTORS

The investigation of a device covered in this category does not include the effects it may have on the system or equipment connected thereto.

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60950, "Information Technology Equipment," UL 3101-1, "Electrical Equipment for Laboratory Use," UL 1012, "Power Units Other Than Class 2 Power Supplies" and UL 73, "Motor Operated Appliances."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWVJ", and may also include the appropriate product name as shown in the individual Listings.

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PROCESS EQUIPMENT (TWWT)

This category covers semiconductor process equipment, process management equipment, and process signaling equipment. Equipment covered by this category includes, but is not limited to equipment involving:

Chemical Mechanical Planarization (CMP)

Chemical Vapor Deposition (CVD)

Dry Etching

Epitaxy

Ion Implantation

Liquid Heating

Lithography

Photomasking

Physical Vapor Deposition (PVD)

Spin/Rinse Drying

Vacuum Deposition (Evaporation/Sputtering)

Wet Etching

Scrubbers

Equipment covered by this category may use liquid chemicals to complete a process. Equipment that does not utilize liquid chemicals for a process (i.e. serves only to distribute, store, or prepare the liquid chemicals) is covered in the category Liquid Chemical Distribution System Equipment (TWSP). Process Equipment has been Classified only as to fire and electric shock hazards incident to their use. The chemical hazards associated with this equipment (i.e. compatibility, inhalation, ingestion, or contact) have not been evaluated. See Semiconductor Manufacturing Equipment (TWKH) for additional information.

The basic standard used to investigate products in this category is UL3121-1, Standard For Process Control Equipment.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products includes: (1) the UL symbol; (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory); (3) one of the following category identifiers: "Semiconductor Manufacturing Equip" or "TWWT", and may also include the appropriate product name as shown in the individual listings; (4) "AS TO FIRE AND ELECTRIC SHOCK ONLY"; and (5) a control number.

SEMICONDUCTOR MANUFACTURING EQUIPMENT, LIMITED PRODUCTION (TWWU)

USE

This category covers equipment and accessories that are of limited production. Equipment bearing the limited production Classification is not under routine Follow-Up Service.

Limited production equipment bearing the Classification Marking has been Classified only as to electrical fire and shock hazards incident to its use in ordinary locations.

RELATED PRODUCTS

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2011, "Outline of Investigation for Factory Automation Equipment," NFPA 79, "Electrical Standard for Industrial Machinery" and UL 508, "Industrial Control Equipment."

LOOK FOR CLASSIFICATION MARKING ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification Service. The Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "AS TO ELECTRICAL FIRE AND SHOCK ONLY," a control number, and the product identifier "Semiconductor Manufacturing Equipment, Limited Production."

SERVICE CABLE (TXKT)

SERVICE ENTRANCE CABLE (TYLZ)

GENERAL

This category covers service entrance cable designated Type SE and Type USE for use in accordance with Article 338 of NFPA 70, "National Electrical Code" (NEC).

Service entrance cable, rated 600 V, is Listed in sizes 14 AWG and larger for copper, and 12 AWG and larger for aluminum or copper-clad aluminum. Type SE cable contains Type RHW, RHW-2, XHHW, XHHW-2, THWN or THWN-2 conductors. Type USE cable contains conductors with

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insulation equivalent to RHW or XHHW. Type USE-2 contains insulation equivalent to RHW-2 or XHHW-2 and is rated 90°C wet or dry.

The cable is designated as follows:

Type SE — Indicates cable for aboveground installation. Both the individual insulated conductors and the outer jacket or finish of Type SE are suitable for use where exposed to sun.

Types USE and USE-2 — Indicates cable for underground installation including direct burial in the earth. Cable in sizes 4/0 AWG and smaller and having all conductors insulated is suitable for all of the underground uses for which Type UF cable is permitted by the NEC. Types USE and USE-2 are not suitable for use in premises or aboveground except to terminate at the service equipment or metering equipment. Both the insulation and the outer covering, when used, on single and multiconductor Types USE and USE-2, are suitable for use where exposed to sun.

Submersible Water Pump Cable — Indicates a multiconductor cable in which 2, 3 or 4 single-conductor Type USE or USE-2 cables are provided in a flat or twisted assembly. The cable is listed in sizes 14 AWG to 4/0 AWG inclusive, copper, and 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The insulation may also be surface marked "Pump Cable." The cable may be directly buried in the earth in conjunction with this use.

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Based upon tests which have been made involving the maximum heating that can be produced, an uninsulated conductor employed in a service cable assembly is considered to have the same current-carrying capacity as the insulated conductors even though it may be smaller in size.

PRODUCT MARKINGS

The Type designation of the conductors may be marked on the surface of the cable. When used, this marking indicates that the temperature rating for the cable corresponds to the temperature rating of the conductors. When this marking does not appear, the temperature rating of the cable is 75°C.

Cable acceptable for installation in cable trays is so marked.

Cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad AL." Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 854, "Service-Entrance Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Service entrance cable that contains copper or copper-clad aluminum conductor(s) has the product name "Service-Entrance Cable"; service-entrance cable that contains aluminum conductors has the product name "Aluminum Service-Entrance Cable."

Service Entrance Cable Fittings (TYZX)**GENERAL**

This category covers service entrance cable connectors and service entrance heads or hoods suitable for use with service entrance cable.

Raintight Fittings — Rubber and neoprene gland type fittings which are suitable for being raintight are identified by a marking on the carton.

Cable Size — Fittings are marked on the carton with the cable range sizes for which the fitting is intended to be used.

MARKINGS

Some connectors are also acceptable for use with flexible cord, flexible nonmetallic tubing or nonmetallic-sheathed cable as indicated on the device or carton. Connectors for use with nonmetallic-sheathed cable are also suitable for use with multiconductor underground feeder and branch circuit cable where used in dry locations.

RELATED PRODUCTS

Fittings covered under Power and Control Tray Cable Connectors (QPOZ), Nonmetallic-sheathed Cable Connectors (PXJV), Conduit Fittings

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(DWTT) and Armored Cable Connectors (AWSX) are also suitable for use with service entrance cable when specifically indicated on the device or carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Service Entrance Cable Fitting," "Connector," "Service Entrance Head," or other appropriate product name as shown in the individual Listings.

**SHIELDED NONMETALLIC
SHEATHED CABLE (UBUR)**

Shielded Nonmetallic-Sheathed Cables are multi-conductor cables constructed in accordance with and intended for the uses permitted in Article 337 of the National Electrical Code. These cables are labeled in sizes 18 AWG through 2 AWG copper, or 12 AWG through 2 AWG aluminum or copper-clad aluminum. The individual conductors are labeled Types TFN, TFFN, THHN, or THWN. These cables are rated 600 volts, maximum.

The temperature rating of the cable is marked at regular intervals on the outer surface of the jacket. The ampacity of a cable is governed by the surface marked temperature rating in conjunction with the columns bearing that temperature in the applicable tables of the National Electrical Code, and the appropriate derating factor, and not by the type of individual conductors employed. Copper-clad aluminum conductors are suitable for the same ampacity as aluminum conductors.

Each of the individual conductors is numbered for identification from each other by durable marking on two sides, 180 degrees apart, every 6 inches of length, with alternate legends inverted.

The resistance to the vapors of various atmospheres, outlined in Article 500 of the National Electrical Code, for which the cable jacket has been evaluated by Underwriters Laboratories, Inc. are indicated on the cable reel tag marking.

Shielded Nonmetallic-Sheathed Cables are identified by "Type SNM" printed on the surface of the outer jacket.

For conductor termination information, see Guide AALZ information.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and a product name. A shielded nonmetallic-sheathed cable that contains copper or copper-clad aluminum conductor has the product name, "Shielded Nonmetallic Sheathed Cable"; a shielded nonmetallic-sheathed cable that contains aluminum conductor has the product name, "Shielded Nonmetallic Sheathed Aluminum Cable".

SHIPBOARD CABLE, MARINE (UBVZ)**USE AND INSTALLATION**

This category covers cable for installation and use aboard marine vessels, fixed and floating offshore petroleum facilities and mobile offshore drilling units (MODUs) in accordance with Section 111.60 of the United States Coast Guard Electrical Engineering Regulations, Sub Chapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive). This cable is not evaluated for use in accordance with NFPA 70, "National Electrical Code."

The cable covered under this category is distribution cable rated 600 V, 1 kV, 2 kV or 5 kV, 5-35 kV shielded, control cable rated 600 V, 1 kV, and signal and instrumentation cable rated 300 V.

PRODUCT MARKINGS

Cable is surface marked with temperature and voltage rating and the cable Type designation.

Cable surface marked with a low temperature rating complies with low temperature bending and low temperature impact tests.

Cable surface marked "FT4" complies with the requirements of the CSA FT4 Flame Test.

Cable that has a continuous corrugated aluminum armor is identified by the marking "CWCMC" in addition to the cable Type designation.

ADDITIONAL INFORMATION

For additional information, see Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1309, "Marine Shipboard Cable."

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 1580-2001" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 45-1998" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEC 60092 Part No. [specify appropriate Part No.]" complies with the construction and performance requirements of that international standard.

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEEE 1580-2001, IEEE 45-1998, or IEC 60092 Part No. 350, 353, 354, 373, 374, 375 and/or 376. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and "ALSO CLASSIFIED IN ACCORDANCE WITH [Specification name and number]."

SHIPBOARD CABLE FITTINGS, MARINE (UBWE)

USE AND INSTALLATION

This category covers fittings for use with marine shipboard cable with and without metal wire armor and with and without nonmetallic jacket over the metal wire armor. No splices of conductors are intended to be made in the fittings. Restrictions on application, position, and/or location of the fittings are indicated in the manufacturer's instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings included an evaluation for conformity to the installation and use provisions of Sub-part 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive) as applied by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Shipboard Cable, Marine (UBVZ), Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Fittings for Cable and Conduit."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable Fitting" or other appropriate product name as shown in the individual Listings.

SIGNS (UXYT)

USE AND INSTALLATION

This category covers electric signs employing incandescent lamps, LEDs (light emitting diodes), electro-luminescent panels, neon tubing, fluorescent lamps, high intensity discharge lamps or combinations thereof for installation in accordance with Article 600 of NFPA 70, "National Electrical Code."

Cord and plug-connected signs do not have provision for permanent mounting to a building or structure. Due to servicing considerations, specific types of cord and plug-connected signs are intended and have provision for installation on end-use equipment.

Signs or sections of a sign forming a complete enclosure intended for permanent connection to a source of supply are provided with permanent means for attachment to a building, to a support or to a hanging rig. The mounting hardware, poles and other structural components of a sign have not been evaluated with respect to local variable conditions such as local wind and snow loading or soil conditions.

Electric signs, of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each major subas-

sembly bears an "Electric Sign Section" Listing Mark. Sign faces, trim and mounting hardware are not considered major subassemblies. Each sign has installation instructions describing or illustrating the proper assembly, mounting and connection of the sign sections. The acceptability of the assembled sections in the field rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

Signs intended for permanent installation and which have been investigated for indoor use only are so marked. Cord-connected signs investigated for outdoor use are marked "Outdoor." Signs for outline lighting are marked "Outdoor Sign for Outline Lighting."

Signs, sign sections or outline lighting marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary fault protection requirements specified in UL 2161, "Neon Transformers and Power Supplies."

REBUILT PRODUCTS

This category also covers signs that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt signs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt signs are subject to the same requirements as new signs.

RELATED PRODUCTS

Accessories intended for use in Listed signs are covered under Sign Accessories (UYMR).

Retrofit conversions intended to be field installed in Listed electric signs are covered under Sign Conversions, Retrofit (UYWU).

Changing message center signs may contain integral controllers or may be intended for use with externally connected controllers. Externally connected controllers are covered under Sign Controllers, Message Centers (UYTQ).

This category does not cover billboard illumination, exit lights, skeletal neon tubing for show windows, or illuminated clocks rated 600 V or less.

Field-assembled neon systems used in display windows, outline lighting, or skeletal neon signs are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

Field-assembled cold cathode electric discharge lighting systems that provide general illumination are covered under Electric Discharge Lighting Systems, Cold Cathode (IFAY).

Field-installed neon outline lighting systems that outline or call attention to architectural details of a room or building are covered under Field Installed Neon Outline Lighting Systems (UYAM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 48, "Electric Signs."

Electric signs that comply with the requirements in UL 153, "Portable Electric Lamps" may also be Listed as Portable Lamps (QOWZ) in the Electrical Appliance and Utilization Equipment Directory.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Indoor Electric Sign," "Electric Sign" or "Electric Sign Section."

For rebuilt signs the word "Rebuilt" precedes the product name.

FIELD INSTALLED NEON OUTLINE LIGHTING SYSTEMS (UYAM)

This category covers neon outline lighting systems that incorporate neon tubing with ferrule type end caps which are electrically connected to the output of a transformer, power supply or ballast by ferrule type lampholders. Each transformer or power supply in the system has a maximum output current rating of 300 mA. These systems are for installation in accordance with Article 600 of the National Electrical Code.

These lighting systems outline or call attention to architectural details of a room or building.

Neon outline lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a neon outline lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction nor approval of the installation. The final acceptance of the field installed neon outline lighting system is the responsibility of the Authority Having Jurisdiction.

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These systems are intended for permanent installation indoors unless marked as "Suitable for Outdoor Locations".

Neon outline lighting systems marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary ground-fault protection requirements specified in the Standard for "Neon Transformers and Power Supplies", UL 2161.

The basic standard used to investigate products in this category is UL 48, "Electric Signs".

This category does not cover neon tubing for display windows or signs which are covered under category Signs (UYXT).

This category does not cover field assembled neon systems in display windows, outline lighting, or skeletal neon signs which are covered under the category of "Field Assembled Skeletal Neon Signs and Outline Lighting Systems", (UZBL)

This category does not cover cold cathode electric discharge lighting systems for general illumination which are covered under the category "Electric Discharge Lighting Systems, Cold Cathode", (IFAY).

Outline lighting of the incandescent, HID or fluorescent type fabricated in factory-built sections is covered under the category Signs (UYXT).

Lighting systems operating at 1000V or less are covered under categories Fluorescent Fixtures (IEUZ), HID Fixtures (IEXT), and Incandescent Fixtures (IEZR).

The Listing Mark of Underwriters Laboratories Inc. on each transformer and transformer enclosure, and the containers in which the remaining neon outline lighting system parts are packaged, or on the remaining neon outline lighting system parts themselves, referencing a specific field-installed neon outline system number is the only method provided by UL to identify neon outline lighting systems manufactured under its Listing and Follow-Up Services. The Listing mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, the product name, "Field Installed Neon Outline Lighting System Part", and the words "The Listing of this neon outline lighting system is contingent upon installation according to the specifications of (Listee's Name), System No. _____ and the National Electrical Code".

SIGNS, CHANGING MESSAGE (UYFS)

GENERAL

This Listing covers illuminated and nonilluminated changing message signs intended to be installed and connected to an electrical supply source in accordance with the National Electrical Code, ANSI/NFPA-70.

Illuminated changing message signs include incandescent, fluorescent, HID (high intensity discharge), electric discharge tubing (including neon) LED (light emitting diode), and other sources of illumination.

Non-illuminated changing message signs include scrolling, flipper, LCD (liquid crystal display), and similar types that are generally motor operated or electronically controlled.

Sign Section — The changing message signs may be divided into sections. Each section of the sign bears a "Changing Message Sign Section" Listing Mark that states in combination with the Listing Mark "Section _____ of _____." The first blank space identifies the number of the section, and the second blank space identifies the total number of sections required to constitute a complete changing message sign. Suitable installation instructions describing or illustrating the proper assembly, mounting, and connection of the numbered sign sections are provided.

This Listing also covers rebuilt changing message signs which have been reconditioned or rebuilt. Such changing message signs have been factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Reconditioned or rebuilt changing message signs are subject to the same requirements as new changing message signs.

Components and parts intended for use on or with changing message signs are Listed or Classified under the separate categories of Sign Accessories (UYMR), Sign Conversions Retrofit (UYWU), and Sign Controllers - Message Centers (UYTQ).

Changing message signs may also be Listed under category Signs (UYXT).

SIGN INSTALLATION MARKINGS

Indoor/Outdoor Use — Permanently connected changing message signs are investigated and intended for use outdoors unless marked "For Indoor Use Only." Cord-Connected changing message signs are investigated and intended for use indoors unless marked "Portable Outdoor Changing Message Sign."

Trailer Mounted — Changing message signs intended to be trailer mounted are marked "Trailer On Which Sign May Be Mounted Has Not Been Investigated."

Orientation Marking — A changing message sign intended for outdoor use that is not provided with construction features to ensure proper orientation is marked to indicate the proper mounting position.

Wall Mounted — A changing message sign for outdoor use, wall mounting and provided with drain holes along the bottom edge of the

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back of the sign, and marked "Maintain 1/2 Inch Clearance Between All Drain Openings And The Mounting Surface" is intended to be installed so that the drain holes are not covered by the building surface.

The basic standards used to investigate products of this category are UL 48 "Electric Signs" and UL 1433 "Control Centers For Changing Message Type Electric Signs."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. A Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED", a control number, and one of the following product names as appropriate "Indoor Changing Message Sign", "Changing Message Sign", "Changing Message Sign Section", or the product name preceded by the word, "Rebuilt."

SIGN ACCESSORIES (UYMR)

USE

This category covers sign components such as combinations of frame plastic panels with metal or plastic characters, sign rotating equipment for use in electric signs where weather protection and electrical enclosure are provided by the sign, ballast lead covers or enclosures intended to provide weather and mechanical protection to leads of outdoor ballasts, fluorescent U-tube and lampholder assemblies consisting of lampholders in sheet metal brackets with spring and loaded rod and hook assemblies with or without ballast, insulating caps for use on electrode receptacles to provide electrical insulation, low voltage power supplies consisting of assemblies of Class 2 transformers, an enclosure and a power supply cord, and kick-back bases intended for indoor use and provided with a receptacle for connection of a related display and provided with a power supply cord.

RELATED PRODUCTS

Lampholders and electrode receptacles are covered under Lampholders, Electric Discharge, More Than 1000 Volts (OJOV).

ADDITIONAL INFORMATION

For additional information, see Signs (UYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 48, "Electric Signs" and UL 73, "Electric Motor Operated Appliances."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sign Accessory."

SIGN COMPONENTS CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (UYTA)

USE AND INSTALLATION

This category covers specific components that are Classified for use with components manufactured by others, such as:

Listed GTO cable surface marked "Integral Sleeve" that is also Classified for use with specific Listed or Recognized Component neon electrode boots; and Listed or Recognized Component neon electrode boots that are also Classified for use with specific Listed GTO cable surface marked "Integral Sleeve."

The combination of the GTO cable with integral sleeve and neon electrode boot has been evaluated and found to comply with the enclosure requirements for:

- a) the splice between neon tubing electrode leads and GTO cable, and
- b) the GTO cable leading to the splice.

These products are provided with installation instructions that define the scope of the system and method of installation.

ADDITIONAL INFORMATION

For additional information, see Signs (UYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 879B, "Outline of Investigation for Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and one of the following statements as appropriate:

GTO Cable with Integral Sleeve (or Neon Electrode Boot, as appropriate) Cat. No. _____ for use only with the specified Neon Electrode Boot (or

GTO Cable with Integral Sleeve, as appropriate) in _____ (blank to be completed with "dry and damp" or "dry, damp and wet" as appropriate) locations. See installation instructions.

or
GTO Cable with Integral Sleeve (or Neon Electrode Boot, as appropriate) Cat. No. _____ for use only with _____ (blank to be completed with the manufacturer's name and catalog number, or equivalent, of the Neon Electrode Boot or GTO Cable with Integral Sleeve, as appropriate) in _____ (blank to be completed with "dry and damp" or "dry, damp and wet" as appropriate) locations.

SIGN CONTROLLERS, MESSAGE CENTERS (UYTQ)

This category covers control panels or units for changing message signs.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1433, "Control Centers for Changing Message Type Electric Signs."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sign Controller" or other appropriate product name.

SIGN CONVERSIONS, RETROFIT (UYWU)

USE AND INSTALLATION

This category covers retrofit sign conversions consisting of subassemblies or kits intended for field installation in Listed signs. There are several types of sign conversions as specified below.

Scrolling units (motor-operated message assemblies), devices to change the type of illumination (from incandescent to fluorescent), or combinations thereof consist of subassemblies intended for field installation in specific Listed, permanently connected electric signs. The conversion identifies the catalog number (or other description) and company name of the sign in which it is to be used.

The LED (Light Emitting Diode) kits consist of the power source, the LEDs and the LED mounting means necessary to change the type of illumination originally contained in the sign to LED illumination. The kit installation instructions specify the type of sign in which the kit is intended to be installed.

These retrofit sign conversions have been investigated by UL to determine that, when used in accordance with the manufacturer's instructions provided with the retrofit device, they do not adversely affect the operation of the complete electric sign.

ADDITIONAL INFORMATION

For additional information, see Signs (UYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate retrofit sign conversions is UL 48, "Electric Signs." The basic requirements used to investigate retrofit sign conversion LED kits are contained in Subject 879A, "Outline of Investigation for LED Kits."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information:

RETROFIT SIGN CONVERSION

FOR USE ONLY WITH SIGN

MODEL _____ MANUFACTURED BY _____

or

RETROFIT SIGN CONVERSION LED KIT

FOR USE ONLY

IN ACCORDANCE WITH KIT INSTRUCTIONS

SIGN FLASHERS (UYZZ)

This listing covers flashing devices intended to control incandescent lamps or gas tube sign transformers.

The installation of open type flashing devices in electric signs shall be in accordance with the National Electrical Code as follows: (a) within a standard cutout box or cabinet, or (b) within an enclosed compartment, accessible and weatherproof, of metal at least as thick as that of the sign itself and located in or on the body or structure of the sign.

Flashing devices of the thermostatic type are intended to control incandescent lamps and are for indoor use only.

The basic standards used to investigate products in this category are UL48, "Electric Signs", UL1433, "Control Centers for Changing Message Type Electric Signs" and UL508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Sign Flasher", "Blinker", "Winker", "Flasher", or other appropriate product name.

SKELETAL NEON SIGN AND OUTLINE LIGHTING SYSTEMS, FIELD ASSEMBLED (UZBL)

The presence of the Listing Mark ("Field Assembled Skeletal Neon Sign System" or "Field Assembled Skeletal Neon Outline Lighting System") is evidence that the installation of the skeletal neon sign or outline lighting system (1) has been assembled and installed by an installer who is authorized by UL to apply UL Listing Marks described below and who subscribes to UL Follow-Up Service; (2) employs materials and components subject to a factory inspection service bearing the UL Mark; and (3) is subject to a field inspection program covering proper installation of the system.

These systems are field assembled for permanent installation in accordance with Article 600 of the National Electrical Code.

"The basic standard used to investigate a system in this category is the Standard for Electric Signs, "UL 48.

Skeletal neon signs and outline lighting systems marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary ground-fault protection requirements specified in the Standard for "Neon Transformers and Power Supplies", UL 2161

The Listing of a system does not constitute approval of the completed assembly and installation which is the responsibility of the installer and the Authority Having Jurisdiction.

This category does not cover field assembled cold cathode electric discharge lighting systems that provide general illumination. Those products are covered by the category "Electric Discharge Lighting Systems, Cold Cathode, (IFAY)".

This category does not cover field installed neon outline lighting systems that outline or call attention to architectural details of a room or building. Those products are covered by the category "Field Installed Neon Outline Lighting Systems", (UYAM).

This category does not cover factory assembled neon signs and outline lighting or sectional signs that require some field assembly. Those products are covered under the category Signs, UXYT.

These systems are intended for outdoor use unless marked for indoor use.

The Listing Mark on the transformer or power supply enclosure is the only method provided by UL to identify that a Field Assembled Skeletal Neon Sign or Outline Lighting System is covered under its Listing and Follow-Up Service. The Listing Mark for these systems includes the name and symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED", a control number, the installing company name or logo, date of installation, location and the following words as appropriate "Field Assembled Skeletal Neon Sign System" or "Field Assembled Skeletal Neon Outline Lighting System".

SOLDERING FLUXES AND FLUXED SOLDERS (VABV)

The soldering fluxes, including those incorporated in finely divided solders, and in cored solders, listed on the following cards are for ordinary use in soldering electrical conductors to copper, brass, tinplate, galvanized iron, etc. The fluxes facilitate the making of secure mechanical and electrical bonds between the solder and the metal to which it is applied. These fluxes are not likely to cause corrosion of soldered parts, but excess flux should be removed. The use of these fluxes for soldering electronic devices, or for other application where the conductivity of residual flux must be taken into consideration, has not been investigated.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Soldering Flux", "Fluxed Solder".

SURGE ARRESTERS, 1000 VOLTS AND HIGHER (VZQK)

This category covers surge arresters rated 1000 Vac and higher intended to repeatedly limit the voltage surges on 48-62 hz power circuits and to afford protection against surge related damage to wiring systems and/or to downstream equipment.

Surge arresters are categorized by their intended application and prescribed test requirements. These categories are: station, intermediate, distribution heavy duty, distribution normal duty, and distribution light duty.

The basic standard used to investigate metal-oxide surge arresters is ANSI/IEEE C62.11, "Standard for Metal-Oxide Surge Arresters for AC Power Circuits". All other types of surge arresters are investigated to IEEE C62.1, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits.

Low-voltage surge arresters (less than 1000Vac) are Listed under the category Lightning Protection Surge Arresters, OWHX.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Arrester", "Distribution Normal Duty Surge Arrester", "Station Class Surge Arrester", or other appropriate product name.

SWIMMING POOL AND SPA EQUIPMENT (WABX)

USE

This category covers equipment for use with swimming pools, decorative pools, wading pools, therapeutic pools, and hot tubs and spas in accordance with Article 680 of NFPA 70, "National Electrical Code" (NEC).

This category also covers self-contained hot tubs and spas as well as cord-connected portable appliances for use with aboveground storable swimming pools, hot tubs and spas.

Information concerning the suitability of the equipment for use indoors or outdoors is given in the General Information Section for each individual category.

RELATED PRODUCTS

Ground fault circuit interrupters intended for use with swimming pool equipment are covered under Ground Fault Circuit Interrupters (KCSX).

Suction fittings are covered under Swimming Pool and Spa Suction Fittings (WEBS) in the Plumbing and Associated Products Directory and the Electrical Construction Equipment Directory.

Fountains covered by Article 680, Part E, of the NEC are covered under Architectural and Floating Fountains (AWEG).

BLOWERS (WAGN)

USE AND INSTALLATION

This category covers equipment intended to introduce pressurized air into spas and hot tubs to create a hydromassage effect. They are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

Products Listed in this category are acceptable for both indoor and outdoor use unless marked otherwise. They are provided with an accessible pressure wire connector for equipotential bonding during installation.

To avoid water contacting live electrical parts, these products are to be installed in accordance with the manufacturer's instructions and permanently mounted at least 12 inches above the overflow level of the spa or hot tub.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of the Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Spa Blower," "Hot Tub Blower" or "Spa/Hot Tub Blower."

CHLORINATORS (WAPV)

This listing covers chlorinators and similar equipment intended for use in the treatment of the water in swimming pools, hot tubs and spas.

Products Listed under this category have been found acceptable for both outdoor and indoor use, unless they are marked "For Indoor Use Only".

The basic standard used to investigate products in this category is UL 1081, "Swimming Pool Pumps, Filters and Chlorinators".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Swimming Pool Chlorinator", "Spa Chlorinator", "Swimming Pool or Spa Chlorinator".

CONTROLS (WAWU)

USE AND INSTALLATION

This category covers controllers, timers, temperature regulating equipment, etc. for control of equipment for use with swimming pools, hot tubs or spas.

Products Listed in this category have been found acceptable for both outdoor and indoor use, unless they are marked "For Indoor Use Only."

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1563, "Electric Hot Tubs, Spas and Associated Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Spa Controller" or "Swimming Pool Controller" or other appropriate product name.

COVERS FOR SWIMMING POOLS AND SPAS (WBAH)

This category includes covers for use with swimming pools, spas and hot tubs. These covers have been evaluated in accordance with the American Society for Testing and Materials (ASTM) Standard F 1346, "Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs."

This category includes manual safety covers and power safety covers, as well as covers of other than the safety type, as defined in the ASTM F 1346 Standard.

INSTALLATION

The ability of the manual or power safety cover to perform its intended function is dependent upon proper installation. Therefore, Authorities Having Jurisdiction should be consulted. Installation should be performed by a qualified installer using the manufacturer's instructions.

MANUAL SAFETY COVERS

A manual safety cover is a barrier that is manually placed over the water. It is intended to impede access to the contained body of water. It is provided with a means for removing significant levels of collected surface water.

POWER SAFETY COVERS

A power safety cover is a barrier that can be placed over the water area and removed with a motorized mechanism. It is intended to impede access to the contained body of water. It is provided with a means for removing significant levels of collected surface water. A power safety cover includes an operator that is Listed under Swimming Pool and Spa Cover Operators, Electric (WDDJ).

OTHER COVERS

A cover of other than the safety type, such as an energy conservation or a solar energy cover, is a cover that has been evaluated in accordance with only the materials, manufacture and labeling requirements of the ASTM Standard. Covers of this type are not intended to impede access to the contained body of water. Such covers are marked "This Is Not A Safety Cover."

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products (shown below) includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "CLASSIFIED", a control number, and one of the following product names as appropriate: "Manual Safety Cover", "Power Safety Cover", or "Pool Cover".

(Product Identity)

CLASSIFIED BY

UNDERWRITERS LABORATORIES INC.

In Accordance With

ASTM F 1346-(Issue Date)

(control number)

LOOK FOR THE CLASSIFICATION MARKING

FIXTURES, LIGHTING AND FIXTURE HOUSINGS (WBDT)

These lighting fixtures are for installation in accordance with Article 680 of the National Electrical Code, NFPA 70. Lighting fixtures which are suitable for use only in fresh water are marked "Fresh Water Only". Lighting fixtures which are suitable for use in either fresh or salt water are marked "Salt Water or Fresh Water." Lighting fixtures which have been investigated for operation only in contact with water are marked "CAUTION To reduce the risk of electric shock submerge before lighting" or the equivalent, and such marking is visible after installation of the lighting fixture.

Dry Niche Underwater Lighting Fixture For Swimming Pools And Spas — These lighting fixtures are intended for permanent installation only in the wall of a swimming pool or field-fabricated spa unless accompanying installation instructions describe the additional option of installation in the bottom of the pool or spa. These lighting fixtures are intended to be installed with the top of the lens not less than 18 in. below the normal water level unless otherwise marked. These lighting fixtures are designed for servicing from the rear in a passage-way behind the pool or spa wall or, if mounted in the bottom of the pool or spa, in a tunnel underneath the pool or spa. For purposes of installation, maintenance, or servicing, the lighting fixture construction may include (1) a factory installed length of flexible cord terminating in an attachment plug and (2) an attachment plug receptacle to which the branch circuit conductors are to be connected.

Wet-Niche Underwater Lighting Fixture For Swimming Pools And Spas — These lighting fixtures are intended to be installed only in the wall of a swimming pool or field-fabricated spa unless accompanying installation instructions describe the additional option of installation in the bottom of the pool or spa. These lighting fixtures are intended to be installed with the top of the lens not less than 18 in. below the normal water level unless otherwise marked. These lighting fixtures are intended for installation in a permanently installed fixture housing (forming shell) in which the lighting fixture will be completely surrounded by water. These lighting fixtures are marked to indicate the proper housings with which they are to be used, and the fixture housings are marked to indicate the lighting fixtures with which the housings are to be used. These lighting fixtures are provided with a factory installed, permanently attached flexible cord with an exposed length of not less than 12 feet. The flexible cord is confined in the fixture housing by the lighting fixture and permits the lighting fixture to be removed from the fixture housing and to be lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the lighting fixture from the branch circuit conductors. Lighting fixtures with longer cords are available for installations where the junction box or splice enclosure is so located that a 12 ft long cord will not permit lighting fixture removal from the fixture housing and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the fixture housing.

No-Niche Underwater Lighting Fixture For Swimming Pools And Spas — These lighting fixtures are intended to be installed only on the walls of a swimming pool or field-fabricated spa unless accompanying installation instructions describe the additional option of installation in the bottom of the pool or spa. These lighting fixtures are intended to be installed with the top of the lens not less than 18 in. below the normal water level unless otherwise marked. These lighting fixtures are intended to be mounted to a bracket permanently secured in or on the pool or spa wall or bottom where the lighting fixture will be completely surrounded by water. These lighting fixtures are provided with a factory installed, permanently attached flexible cord with an exposed length of not less than 12 feet. The flexible cord is confined by the lighting fixture and pool wall or bottom and permits the lighting fixture to be removed from the mounting bracket and to be lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the lighting fixture from the branch circuit conductors. Lighting fixtures with longer cords are available for installations where the junction box or splice enclosure is so located that a 12 ft long cord will not permit lighting fixture removal from the mounting bracket and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored between the lighting fixture and pool or spa wall.

Underwater Lighting Fixture For Above-Ground Storable Swimming Pools — These lighting fixtures are intended for temporary installation only through or on the wall of an above ground storable pool (a pool that has a maximum diameter of 18 ft and a maximum wall height of 3-1/2 ft and lends itself to being readily disassembled and reassembled to its original integrity). These lighting fixtures are intended to be installed with the top of the lens not less than 8 in. and not more than 10 in. below the top of the pool wall unless the lighting fixture is otherwise marked. These lighting fixtures are provided with an integral jacketed flexible cord of not less than 25 ft in length that is intended to be routed away from the pool to the transformer or ground-fault circuit interrupter assembly. The trans-

former or ground fault circuit interrupter assembly is intended to be temporarily mounted to a building structure or the equivalent and is provided with 3-6 ft power supply cord for connection to a source of supply.

Underwater Lighting Fixture For Above-Ground Non-Storable Swimming Pools — These lighting fixtures are intended only for permanent installation through or on the wall of an above ground nonstorable pool. These lighting fixtures are intended to be installed with the top of the lens not less than 8 in. and not more than 10 in. below the top of the pool wall unless the lighting fixture is otherwise marked. These lighting fixtures are intended to be permanently connected to the supply with conduit. For installation, maintenance, or servicing, these lighting fixtures may employ a length of jacketed flexible cord permanently connected between integral components of the lighting fixture.

Convertible Underwater Lighting Fixture For Above-Ground Swimming Pools — These lighting fixtures are initially configured as an Underwater Lighting Fixture For Above-Ground Storable Swimming Pool for use as described farther above. They include provisions for the one time field conversion of the lighting fixture to an Underwater Lighting Fixture For Above-Ground Non-Storable Swimming Pool for use as described above. Once converted, these lighting fixtures are not suitable for being modified back to their original configuration.

Fiber Optic Underwater Lighting Fixture For Swimming Pools And Spas — These lighting fixtures consist of an lamp/electrical enclosure that is intended to be permanently mounted not less than 5 ft from the pool or spa wall and a fiber optic element and associated fittings to transmit the light to the pool or spa. The lamp/electrical enclosure is intended to be installed above the level at which water splashed from the pool or spa or from another source may collect.

The basic standard used to investigate products in this category is UL676, "Underwater Lighting Fixtures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Mounting Bracket For No-Niche Fixture", "Housing For Wet-Niche Fixture", "Underwater Lighting Fixture For Above-Ground Non-Storable Swimming Pool", "Underwater Lighting Fixture For Above-Ground Storable Swimming Pool", "Convertible Underwater Lighting Fixture For Above-Ground Swimming Pool", "Dry Niche Underwater Lighting Fixture For Swimming Pool", "No-Niche Underwater Lighting Fixture For Swimming Pool", "Wet-Niche Underwater Lighting Fixture For Swimming Pool", or "Fiber Optic Underwater Lighting Fixture For Swimming Pool".

HEATERS (WBRR)

This listing covers heaters intended for permanent installation in or adjacent to swimming pools or spas. Heaters for hydromassage bathtubs are covered as part of the hydromassage bathtub Listing.

Products listed under this category have not been evaluated for outdoor use, unless they are marked "For Outdoor Use" or equivalent, in which case they have been found acceptable for both outdoor and indoor use.

The basic standard used to investigate products in this category is UL1261, "Electric Water Heaters for Pools and Tubs".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Heater", "Spa Heater".

HEAT PUMPS (WBVE)

This listing covers products intended to heat swimming pool water, utilizing the heat of rejection from a mechanical refrigeration system, and optional accessories for these products. This equipment is rated 600 v or less and is intended for permanent installation at or near swimming pools and spas in accordance with Article 680 of the National Electrical Code.

These products are designed to restrict the outlet water temperature to a maximum of 50C (122 F) under normal operating conditions and to a maximum of 70C (158 F) under abnormal conditions.

Products listed under this category have not been evaluated for outdoor use, unless they are marked "For Outdoor Use" or equivalent, in which case they have been found suitable for both outdoor and indoor use.

In heat pumps employing two or more motors operating from a single supply circuit the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor equipment is to be connected only to a circuit protected by fuses or a cir-

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cuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR TYPE" circuit breakers, the circuit is to be protected only by the type of protective device specified.

The basic standards used to investigate products in this category are UL 1261, "Electric Water Heaters for Pools and Tubs" and UL 1995, "Heating and Cooling Units".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Heat Pump", "Spa Heat Pump", "Swimming Pool and Spa Heat Pump".

HOT TUB AND SPA EQUIPMENT ASSEMBLIES (WBQY)

This listing covers Equipment Assemblies for use with non self-contained Spas and Hot Tubs, rated 250 volts or less, for household or commercial use; indoors, outdoors or both.

Equipment Assemblies may be cord and plug-connected, convertible, or permanently wired. A convertible Equipment Assembly is shipped from the factory with a power supply cord but is designed for field-conversion to a permanently wired configuration, for 120 volt, 240 volt or either rating. Once a convertible Equipment Assembly is converted to permanently wired, it is not intended to be returned to a cord connected configuration.

Equipment Assemblies are prepackaged combinations of various components such as pumps, filters, heaters, blowers, lights, and controls and are designed for use with field supplied tubs. Equipment Assemblies are designed for installation and use in accordance with Article 680 of the National Electrical Code. Also Equipment Assemblies must be installed at least 5 feet from the inside walls of a Spa or Hot Tub and be connected by non metallic pipe only.

Equipment Assemblies have not been evaluated for below grade installation.

Equipment Assemblies have not been evaluated for use within an outer enclosure or under the skirt of a Spa or Hot Tub, unless so marked.

Equipment Assemblies that contain a gas-fired water heater have not been evaluated for indoor use, for use within an outer enclosure, or for use under the skirt of a Spa or Hot Tub, unless so marked.

This listing also covers Equipment Assemblies which do not contain a water heater and do not contain a water temperature regulating control or a water temperature limiting control. A water heater, a temperature regulating control and a temperature limiting control should be provided in the final installation and their adequacy determined by the local inspection authority.

The basic standard used to investigate products in this category is UL1563, "Electric Spas, Equipment Assemblies, and Associated Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Equipment Assembly For Spa/Hot Tub", "Hot Tub Equipment Assembly" or "Spa Equipment Assembly".

JUNCTION BOXES (WCEZ)

This listing covers junction boxes intended for use with underwater pool lights.

Products listed under this category have been found acceptable for both outdoor or indoor use.

The basic standard used to investigate products in this category is UL1241, "Junction Boxes for Swimming Pool Lighting Fixtures".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Junction Box".

OZONE GENERATORS (WCKA)

These products are ozone generators rated 600 volts or less intended for use in the treatment of nonpotable water in swimming pools, and in spas and hot tubs of other than the self-contained type.

These products have been found suitable for use in Wet and Damp Locations as well as Dry Locations unless marked "For Use In Dry Locations Only."

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These products have been investigated with respect to risks of electric shock, fire, and mechanical injury only.

Ozone generators involve features of installation and use not ordinarily present in electrical utilization equipment. Such features are covered in the manufacturer's installation instructions. The installation must, in all cases, be in accordance with the manufacturer's instructions furnished with the equipment and the requirements of the authorities having jurisdiction.

Maximum ozone threshold limit recommendations are set by the American Conference of Governmental Industrial Hygienists as found in the Code of Federal Regulation (CFR) 801.415. Compliance with the applicable regulations under conditions of normal and abnormal operation has not been investigated by Underwriters Laboratories Inc.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.

**OZONE GENERATOR
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
WITH RESPECT TO RISKS OF ELECTRIC SHOCK,
FIRE AND MECHANICAL INJURY ONLY**

POOL AND SPA EQUIPMENT CLASSIFIED IN ACCORDANCE WITH NSF STANDARD NUMBER 50 (WCNZ)

This category covers pool and spa equipment evaluated in accordance with the National Sanitation Foundation (NSF) Standard No. 50, "Circulation System Components for Swimming Pools, Spas, or Hot Tubs."

These products include filters, centrifugal pumps, surface skimmers, ozone generators, chemical feeding equipment, chlorinators and other units installed in water circulation and filtration systems of pools, spas, and hot tubs. Some products Classified under this category may also be Listed under the categories of Water Treatment Equipment (WDL), Miscellaneous, Swimming Pool and Spa Equipment (WDUT) or Pumps (WCSX).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word "CLASSIFIED", a control number, and one of the following product names as appropriate: "Swimming Pool Filter", "Ozone Generator", "Spa Chlorinator", or other appropriate product name.

**(Product Identity)
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
In Accordance With
NSF Standard No. 50 — (Issue Date)
(Control Number)**

For those products which are also Listed or Classified by Underwriters Laboratories Inc. under another category, the marking includes the appropriate Listing Mark or Classification Marking and the statement "Also Classified by Underwriters Laboratories Inc. in accordance with NSF Standard No. 50 — (Issue Date)".

POTTING COMPOUNDS (WCRY)

This category covers compounds intended to be used to encapsulate grounding and bonding conductor splices or terminations in swimming pool, spa or fountain equipment such as fixtures, fixture housings, and junction boxes where the splices or terminations may be exposed to salt-free swimming pool or fountain water and sunlight for varying lengths of time, including continuous exposure. This category also covers potting compounds used to fill underwater junction boxes.

These compounds have been evaluated by Underwriters Laboratories Inc. for their resistance to the deteriorating effects of salt-free swimming pool and fountain water and ultraviolet light. They have also been evaluated for their ability to adhere to typical metals such as copper alloy, stainless steel and to plastic. The container or package is marked to identify the materials to which the compound has been determined to suitably adhere.

The basic requirements used to investigate products in this category are "Outline of Investigation For Potting Compounds For Swimming Pool, Fountain and Spa Equipment", Subject 676A.

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control

number and the following product name: "Swimming Pool, Fountain and Spa Equipment Conductor Splice Potting Compound" (any of the locations maybe omitted).

PUMPS (WCSX)

This listing covers pumps for circulating the water in swimming pools, hot tubs and spas. These products are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

Products listed under this category are acceptable for both outdoor and indoor use, unless marked otherwise and have been investigated for use with either permanently installed pools or storable pools.

Pumps investigated for permanently installed pools are so identified and are additionally marked "Do Not Use With Storable Pools". Permanently installed pool pumps are intended to be permanently connected to the water circulation system and they may be permanently wired or provided with a 3 ft nondetachable power supply cord terminating in a grounding type attachment plug. The attachment plug may be of the locking or nonlocking type. Units provided with locking type attachment plugs are intended to be installed at least 5 ft from the inside walls of the pool and are marked accordingly. Units provided with a nonlocking type attachment plug are intended to be installed at least 10 ft from inside walls of the pool and are marked accordingly. Permanently installed pool pumps are provided with an accessible pressure wire connector for equipotential bonding.

Pumps investigated for storable pools are so identified and are additionally marked "Do Not Use With Permanently Installed Pools". Storable pool pumps are intended to be connected to a water circulation system constructed so that the pump may be readily disassembled from the system for storage and future reassembly to its original integrity. Storable pool pumps are provided with a minimum 25 ft non detachable power supply cord terminating in a grounding type attachment plug, are double insulated, have no accessible grounded metal parts, have inaccessible non current-carrying metal parts connected to the grounding conductor of the supply cord and do not have an equipotential bonding connector.

These pumps may be provided with integral filters. The suitability of the filters to clean water has not been determined. Filters that have been evaluated in accordance with requirements of the National Sanitary Foundation (NSF) Standard No. 50 are contained in the product category "Pool and Spa Equipment Classified In Accordance With NSF Standard No. 50" (WCNZ).

The basic standard used to investigate products in this category is UL1081, "Swimming Pool Pumps, Filters and Chlorinators".

This Listing also covers pumps which are rebuilt using new or reconditioned parts by the original manufacturer or another party having the necessary facilities, technical knowledge, and manufacturing skills. Rebuilt pumps are subjected to the same requirements as new pumps.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Swimming Pool Pump", "Spa Pump", "Swimming Pool or Spa Pump", or other appropriate product name. For rebuilt products, the product name includes the word "Rebuilt", "Remanufactured", or "Reconditioned" as part of the Listing Mark.

SELF-CONTAINED SPAS (WCZW)

This listing covers self-contained Spas for aboveground use, for household or commercial use, and for both indoor and outdoor use, unless marked otherwise. These spas are not designed or intended to have the water drained after each use. They are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

A self-contained spa is a continuous duty appliance in which all control, water-heating and water-circulating equipment is an integral part of the product, located entirely under the spa skirt.

Self-contained spas may be cord connected, convertible, or permanently wired. A convertible spa is shipped from the factory with a power supply cord but is designed for field-conversion to a permanently wired configuration, either 120 volt, 240 volt, or both. Once a convertible spa is converted to permanently wired, it is not intended to be returned to a cord connected configuration.

Self-contained spas may be provided with electric or gas heaters. Spas with gas heaters are intended for permanent wiring and permanent installation, and are intended for outdoor use only.

Each spa is provided with a marking on the wiring diagram in the field wiring compartment or in the installation instructions or on a separate configuration sheet, to identify the major components of the spa when manufactured. The configuration sheet and the installation instructions are intended to be available during installation and inspection.

Self-contained spas may be shipped completely assembled or in knock-down form.

Knockdown spas are packaged by major component in multiple cartons to aid in shipping. They consist of a completely assembled and plumbed tub and an equipment package. The skirt may be attached to the tub or it may be provided in prefabricated sections for assembly in the field. The equipment package is completely assembled, pre-wired, and plumbed. Connections are made by union fittings or similar quick-disconnect plumbing which does not require tools or special materials. All cartons used to ship a knockdown spa are marked to indicate the contents, the spa model, and the total number of required cartons.

Hydromassage bathtubs are listed under Hydromassage Bathtubs (NCHX); hydrotherapy equipment for professional treatment of athletes or patients is listed under Medical and Dental Equipment, Professional (KFBQ) — both categories are located in the Electrical Appliance and Utilization Equipment Directory. Factory made assemblies of pumps, heaters, blowers, lights and controls for use with field supplied hot tubs and spas are Listed under Hot Tub and Spa Equipment Assemblies (WBQY).

The basic standard used to investigate products in this category is UL1563, "Electric Spas, Equipment Assemblies, and Associated Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self Contained Spa".

SWIMMING POOL AND SPA COVER OPERATORS, ELECTRIC (WDDJ)

This Listing covers electrically driven cover operators for use with swimming pools and spas together with controls for use with such operators. The cover operators generally consist of a motor driven apparatus used to move the covering material. These operators are intended to be installed in accordance with Article 680 of the National Electrical Code. Products Listed under this category have been found suitable for both indoor and outdoor use.

The basic standards used to evaluate the operators are UL 1081, "Swimming Pool Pumps, Filters, and Chlorinators" and UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment".

Some products Listed under this category may incorporate pool covers that may be Classified under the category "Covers For Swimming Pools and Spas" (WBAH). Unless Classified as a power safety cover under the category of "Covers For Swimming Pools and Spas" (WBAH), a cover provided with the operator has not been evaluated as a safety cover.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Swimming Pool Cover Operator," "Spa Cover Operator," or "Pool Cover Operator".

SWIMMING POOL AND SPA TRANSFORMERS (WDGV)

Swimming pool and spa transformers are of the two-winding type having a grounded metal barrier between the primary and secondary windings and are intended to supply swimming pool, spa, or submersible (fountain) lighting fixtures in accordance with Article 680 of the National Electrical Code. The primary rating is 120 volts and the maximum secondary ratings are 15 volts RMS and 1 KVA. The transformers are provided with integral overcurrent protection.

Unless marked otherwise, these transformers are not suitable for connection to a conduit which extends directly to an underwater pool light forming shell.

Products listed under this category have not been evaluated for outdoor use, unless they are marked "For Outdoor Use" or equivalent, in which case they have been found acceptable for both outdoor and indoor use.

Transformers listed under this category are provided with a power supply cord or have provisions for conduit connection to the branch circuit supply. Transformers not provided with a power supply cord are provided with leads or with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring. Wire binding screws or studs with cupped washers are to be used for cop-wire 10 awg max.

Transformers provided with a power supply cord are intended for supplying low voltage submersible (fountain) lighting fixtures as indicated by marking on the transformer. They are not intended for use with a swimming pool or spa lighting fixtures.

WATER TREATMENT EQUIPMENT (WDLG)

This listing covers chlorinators, brominators, ozone generators, ion generators, and similar equipment intended to sanitize water in pools, spas,

and hot tubs. It also includes equipment designed to monitor water chemistry in pools, spas, and hot tubs, with or without the capability of adding chemicals to the water to adjust water chemistry. These products are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

The ability of this equipment to sanitize pool and spa water has not been determined. Equipment that has been evaluated for sanitation is classified in accordance with the requirements of the National Sanitation Foundation Standard Number 50 and can be located under the category WCNZ "Pool and Spa Equipment Classified in Accordance with NSF Standard Number 50".

Products listed under this category are acceptable for both indoor and outdoor use, unless marked otherwise. They are provided with an accessible pressure wire connector for equipotential bonding during installation.

The basic standards used to investigate products in this category are UL 1081 — "Swimming Pool Pumps, Filters, and Chlorinators" and UL 1563 — "Electric Spas, Equipment Assemblies, and Associated Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Swimming Pool Chlorinator", "Spa Chlorinator", "Swimming Pool and Spa Chlorinator", or other appropriate product name.

SWIMMING POOL AND SPA EQUIPMENT, MISCELLANEOUS (WDUT)

GENERAL

This category covers accessory equipment for swimming pools, hot tubs and spas, such as valves and pool cover operators.

Unless marked otherwise, these products are acceptable for both indoor and outdoor use.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment" and UL 1081, "Swimming Pool Pumps, Filters and Chlorinators."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pool Cover Operator," "Pool Valve Actuator," "Pool Freeze Protector" or other appropriate product name as shown in the individual Listings.

SUCTION FITTINGS FOR SWIMMING POOLS AND SPAS (WEBS)

General — This category covers suction fittings for use in swimming pool, wading pool, spa, hot tub, and hydromassage (whirlpool) bathtub installations.

Ratings — Each suction fitting is marked with a water flow rate in gals per minute. This rate should equal or exceed the maximum flow rate of the pump(s) used in the water circulating system.

Suction fittings have been evaluated for both indoor and outdoor use unless otherwise marked for indoor use only. They should be installed following the instructions that are packaged with each fitting.

Standard — The basic standard used to investigate products in this category is ASME/ANSI A112.19.8M-1987, "Suction Fittings for use in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Appliances."

Listing Mark — The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Suction Fitting".

SWITCHBOARDS (WEIR)

SWITCHBOARDS, DEAD-FRONT (WEVZ)

GENERAL:

Dead front switchboard sections are designed particularly to provide safety for the operator, but they are not necessarily dead back boards.

The basic standard used to investigate products in this category is UL891, "Dead-Front Switchboards".

DEFINITIONS:

A switchboard section is that portion of a switchboard which is prevented by the structural framework from being physically separated into smaller units. Framework that is welded or joined with steel rivets over 1/4 in. in diameter is considered to constitute a single section.

A "switchboard enclosure" is intended to enclose one or more "switchboard sections" or "switchboard interiors", or is intended to provide auxiliary wiring space for an adjacent switchboard section.

A "switchboard interior" is intended to be field-installed in a "switchboard enclosure" to become the equivalent of a "dead front switchboard section".

ELECTRICAL RATINGS:

Dead front switchboards are rated 600 volts or less.

Each switchboard section is marked with the current rating of the supply bus. Within a group of sections, a through or splice bus is not required to be marked with its rating. The ampacity of the through bus and supply bus supplying the next section may be reduced but is not less than the supply rating of the next section. The current rating of the through and splice bus in the last section of a group (which might be used in the future to supply an additional section) is shown in the switchboard section marking if the through or splice bus rating is less than the supply rating of that section. The current rating of the section bus is also included in the marking. The adequacy of the supply, through, splice, or section bus current rating with respect to the calculated load current using the appropriate diversity factors, in Section 230-42 and Article 220 of the National Electrical Code, can only be determined by the local inspection authorities at the final installation.

SHORT CIRCUIT RATINGS:

Dead front switchboard sections or interiors are marked with their DC or RMS symmetrical short-circuit current rating in amps. The marking states that short-circuit ratings are limited to the lowest short-circuit rating of (1) any switchboard section connected in series or (2) the lowest short-circuit rating of any device installed or intended to be installed therein. However, for combination series-connected devices, the short-circuit current rating marked on the switchboard may be higher than the short-circuit current rating of a specific circuit breaker installed or to be installed in the switchboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the switchboard in accordance with the marked instructions. In many cases the short-circuit ratings are associated with instructions for securing supply wiring within the switchboard.

SERVICE EQUIPMENT:

The marking "Suitable for use as Service Equipment" appears on each dead front switchboard section or switchboard interior containing one or more service disconnects optionally intended for use at a service.

A switchboard section or interior marked for use at services as indicated above, may also be used to provide the main control and means of cutoff for a separately derived system or a separate building.

Some AC rated switchboard sections or interiors incorporate neutrals factory bonded to the enclosure. Such units are marked "Suitable only for use as Service Equipment".

Some switchboards may have terminals or provisions for terminals, marked as taps, located on the supply side of the service disconnecting means. The suitability of these terminals as taps connected on the supply side of the service disconnect is intended to be determined in accordance with the National Electrical Code.

GROUND-FAULT PROTECTION:

Some dead front switchboard sections may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking such as on a wiring diagram or on the relaying equipment. Instructions for on site testing of the ground fault protection at the time of installation are provided.

OVERCURRENT PROTECTION:

Where in normal operation the load will continue for 3 hours or more, molded case circuit breakers and fused switches other than fused power circuit devices should not be loaded to exceed 80 percent of their current rating unless the device is otherwise marked. Low Voltage Power Switching Devices and Fused Power Circuit Devices used in Dead Front Switchboards are suitable for continuous use at 100 percent of their rating.

FIELD-INSTALLED EQUIPMENT:

A switchboard section or interior may have provision for the field installation of additional suitable equipment such as branch, splice or through busses, meter socket bases, circuit breakers, switches, panelboards, and terminal connectors. The switchboard section or interior is marked with the name or trade-mark of the manufacturer and the catalog number or equivalent of such equipment that is intended to be installed in the field. A switchboard section or interior may also have provision for utility installed current transformers and metering equipment.

INSTALLATION:

A switchboard section or enclosure which has been investigated to determine that it is rainproof is marked "Type 3R" and may also be marked "Rainproof".

A section or enclosure suitable for connection to a busway is marked to indicate the manufacturer and type of busway.

The acceptability of conduit stubs serving unit sections, with respect to wiring space and spacing from live parts can be determined only by the local inspection authorities at the final installation.

In some cases, field drilling of holes in the ground bus may be needed to add additional grounding terminals.

FIELD TERMINATIONS:

Dead front switchboard sections Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Aluminum conductors may be used if such marking is independent of any marking on terminal connectors and if it appears on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based for wire sizes Nos. 14-1 Awg, on the use of 60 C ampacities and for wire sizes Nos. 1/0 Awg and larger, on the use of 75 C ampacities in table 310-16 of the National Electrical Code.

LISTING MARK:

The Listing Mark of Underwriters Laboratories on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and one of the following product names as appropriate: "Dead Front Switchboard Section", "Switchboard Interior", "Switchboard Enclosure". The Listing Marks for Dead Front Switchboard Sections contain "____ OF ____". The first space is stamped with a number indicating the position that the section occupies in the series of sections constituting the switchboard. The latter space is stamped with the total number of sections in the switchboard (including sections not bearing a UL Listing Mark).

A Listing Mark covers only the section so marked; it does not cover other sections included in the complete switchboard.

SWITCHBOARDS, SPECIAL PURPOSE (WFJX)

This listing covers theater switchboards, incandescent lighting switchboards with dimmers, and laboratory switchboards rated at 600 volts or less.

Switchboards listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60 C ampacities for wire sizes Nos. 14-1 Awg and 75 C ampacities for wire sizes Nos. 1/0 Awg and larger.

SHORT CIRCUIT RATING:

Special purpose switchboards are marked with their DC or RMS symmetrical short-circuit current rating in amps. The marking states that short-circuit ratings are limited to the lowest short-circuit rating of any device installed or intended to be installed therein. However, for combination series-connected devices, the short-circuit current rating marked on the switchboard may be higher than the short-circuit rating of a specific circuit breaker installed or to be installed in the switchboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the switchboard in accordance with the marked instructions. In the case of rack type theater dimming switchboards with removable modules, the rating may depend on the use of specific dimming modules. These dimming modules would be marked on the switchboard. In many cases the short-circuit ratings are associated with instructions for securing supply wiring within the switchboard.

DUTY RATING:

Theater dimming switchboards have been evaluated to operate continuously at 100 percent of their marked input rating.

The basic standard used to investigate products in this category is UL891, "Dead-Front Switchboards".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Laboratory Switchboard", "Theater Switchboard", "Incandescent Lighting Switchboard" or other appropriate product name.

SWITCHES (WFXV)

PULLOUT SWITCHES, DETACHABLE TYPE (WGEU)

This listing covers switches having detachable pullout heads either with or without fuse holders for cartridge fuses. These switches may be enclosed or nonenclosed.

Nonenclosed switches are intended for use in other assemblies such as panelboards, service equipment, or the like.

Enclosed pullout switches may contain meter sockets and/or neutral assemblies and contain more than one independent switch without connection between switches.

Switches without fuse holders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused pullout switches are marked "Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits".

Ratings of enclosed or nonenclosed pullout switches are limited to 600 volts or less, 200 amps or less.

Pullout switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Pullout switches with amp ratings only are suitable for general use only.

Pullout switches rated higher than 100 horsepower are restricted to use as motor disconnecting means and are not for use as motor controllers.

Motor circuit pullout switches are intended for use only in motor circuits and are marked, "Motor-Circuit Pullout Switch".

Horsepower ratings are associated with particular voltages and number of phases. A horsepower rated switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some pullout switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Motor circuit pullout switches and pullout switches with horsepower ratings are tested for interrupting capacity at rated voltage and six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

Switches with direct current horsepower ratings are intended for use with reduced voltage starting.

Switches marked, "Suitable For Use On A Circuit Capable of Delivering Not More Than _____ Amps, RMS, Symmetrical, _____ Volts Maximum: Use Class _____ Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short-Circuit Current Of The Circuit" have been investigated for the additional rating indicated.

Some enclosed pullout switches are suitable for use as service switches. Such switches are marked, "Suitable For Use As Service Equipment".

Some enclosed pullout switches incorporate neutrals that are factory bonded to the enclosure. Such switches are marked, "Suitable Only For Use As Service Equipment".

Enclosed pullout switches marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system or for a second building.

Class CTL pullout switches have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more switch poles than that number for which the assembly is designed and rated.

Class CTL pullout switches may be identified by the words "Class CTL" or "CTL" on the switch as part of the marking.

Enclosed pullout switches that are rain tight or rainproof are marked accordingly.

Pullout switches as listed herein are for use with copper conductors unless marked to indicate that certain terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and appear on a wiring diagram or other readily visible location.

Unless a switch is marked to indicate otherwise, the wire space and current-carrying capacity are based on the use of 60C wire where wire size Nos. 14-1 AWG are used and 75C where wire size Nos. 1/0 AWG and larger are used.

All equipment manufactured after Oct. 1, 1986 will be marked to show a tightening torque for all wire connectors for use with field wiring.

Hinged Pullout Switches are listed under the category of "Dead-Front Switches".

The basic standard used to investigate products in this category is UL1429, "Pullout Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-

tory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Pullout Switch", "Enclosed Pullout Switch", "Motor Circuit Pullout Switch", or "Enclosed Motor Circuit Pullout Switch".

SWITCHES, AUTOMATIC (WGLT)

Switches, Clock-operated (WGZR)

Clock-operated switches Listed with horsepower ratings are tested at rated voltage and at six times motor full load running current for ac ratings and at ten times motor full load running current for dc ratings.

Clock-operated switches have been tested to determine their acceptability for continuous operation at their marked rated load.

Clock-operated switches Listed for control of electric or other heating appliance loads are tested at rated voltage with noninductive resistance loads.

The basic standard used to investigate products in this category is UL917, "Clock-Operated Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Clock Operated Switch", "Timer Switch".

SWITCHES, OPEN TYPE (WHTY)

USE AND INSTALLATION

This category covers open type switches without an enclosure that are provided with a handle operator. These switches are intended for installation in a panelboard, switchboard, motor control center, industrial control panel or the like, or for installation in a Listed cabinet or a cutout box in accordance with the switch installation instructions or without an enclosure where acceptable.

This category covers switches either with or without fuseholders for plug fuses or for cartridge fuses.

These switches are intended to be mounted in enclosures such that they are manually operable by means of an external handle without opening the enclosure. Externally operated handles mounted to the sidewall of an enclosure or through the cover of an enclosure are intended to be installed in accordance with the switch installation instructions.

These switches are for use with copper conductors unless marked to indicate those terminals which are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the current-carrying capacity is based on the use of 60°C wire where wire sizes 14-1 AWG are used and 75°C wire where wire sizes 1/0 AWG and larger are used.

RATINGS

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked "Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits."

Ratings of Listed open type switches are limited to 4000 A, 500 hp, 600 V. Open type switches rated more than 1200 A are intended for isolating use only. Open type switches rated 800 or 1200 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked "For Isolating Use Only - Do Not Open Under Load."

Open type switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Open type switches with ampere ratings only are intended for general use only. Open type motor circuit switches are intended for use only in motor circuits and are marked "Motor-Circuit Switch."

Open type switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Ratings of Listed open type motor circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases: a switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some open type switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Open type switches with horsepower ratings are tested for interrupting capacity at rated voltage and six times motor full load running current for alternating current ratings, and at four times motor full load running current for direct current ratings.

Switches with direct current horsepower ratings are intended for use with reduced voltage starting.

Switches marked "Suitable For Use On A Circuit Capable Of Delivering Not More Than _____ Amperes, RMS Symmetrical, Volts Maximum; Use Class _____ Fuses" have been investigated for the additional rating indicated.

RELATED PRODUCTS

Products with similar uses are covered under Switches, Enclosed (WJAX), Switches, Molded Case (WJAZ), Motor Controllers, Manual (NLRV), Pullout Switches, Detachable Type (WGEU), Switches, Knife (WIOV) and Switches, Dead-Front (WHXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 98, "Enclosed and Dead-Front Switches."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Open Type Switch" or "Open Type Motor-Circuit Switch."

SWITCHES, DEAD-FRONT (WHXS)

USE AND INSTALLATION

This category covers dead-front switches having all current-carrying parts enclosed when mounted in an enclosed panelboard, dead-front switchboard or the like. These switches are manually operable by means of external handles without opening the enclosure or are hinged pullout switches.

This category covers switches either with or without fuseholders for plug fuses or for cartridge fuses.

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked "Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits."

These dead-front switches are for use with copper conductors unless marked to indicate those terminals which are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire where wire sizes 14-1 AWG are used, and 75°C wire where wire sizes 1/0 AWG and larger are used.

RATINGS

Ratings of Listed dead-front switches are limited to 4,000 A, 500 hp, 600 V. Dead-front switches rated more than 1,200 A are intended for isolating use only. Dead-front switches rated 800 or 1,200 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked "For Isolating Use Only — Do Not Open Under Load."

Dead-front switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Dead-front switches with ampere ratings only are intended for general use only.

Some hinged pullout switches achieve an "off" position only by leaving the door open. These switches are restricted to use only as a single main in a panel board or the like and are rated not higher than 200 A and 250 V.

Dead-front switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Enclosed motor-circuit switches are intended for use only in motor circuits and are marked "Motor-circuit Switch."

Ratings of Listed dead-front motor-circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases: a switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some dead-front switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Dead-front motor-circuit switches and dead-front switches with horsepower ratings are tested for interrupting capacity at rated voltage and six times motor full load running current for alternating current ratings, and at four times motor full load running current for direct-current ratings.

Switches with direct-current horsepower ratings are intended for use with reduced voltage starting.

Switches marked "Suitable For Use On A Circuit Capable Of Delivering Not More Than _____ Amperes, RMS Symmetrical, Volts Maximum; Use, Class _____ Fuses" have been investigated for the additional rating indicated.

MARINE USE

Some Listed dead-front switches in this category have been investigated for use aboard marine vessels over 65 feet in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259 (46 CFR, Parts 110-113). Such dead-front switches are identified by a Listing Mark for marine vessels over 65 feet in length.

RELATED PRODUCTS

Enclosed bolted pressure contact switches are covered under Fused Power Circuit Devices (IYSR).

Detachable head pullout switches are covered under Pullout Switches, Detachable Type (WGEU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 98, "Enclosed and Dead-Front Switches."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Dead-front Switch," "Dead-front Motor-circuit Switch" or "Marine Dead-front Switch for Use on Vessels Over 65 Feet," as appropriate.

SWITCHES, ENCLOSED (WIAx)

Enclosed switches and enclosed motor circuit switches are externally operable without opening the enclosure.

This listing covers switches either with or without fuse holders for plug fuses or for cartridge fuses.

Switches without fuse holders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused enclosed switches are marked, "Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits."

Ratings of Listed enclosed switches are limited to 4000 amp, 500 hp, 600 v. Enclosed switches rated more than 1200 amp are intended for isolating use only. Enclosed switches rated 800 or 1200 amp at more than 250 v are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked "For Isolating Use Only — Do Not Open Under Load."

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp rating are intended for general use.

Double-throw switches that have been investigated for switching a common load from a normal supply to an optional standby system are marked "Suitable For Use In Accordance With Article 702 of the National Electrical Code".

Safety Switches

Enclosed switches rated higher than 100 horsepower are restricted to use as motor disconnecting means and are not for use as motor controllers.

Enclosed motor circuit switches are intended for use only in motor circuits and are marked, "Motor-Circuit Switch."

Ratings of Listed enclosed motor circuit switches are limited to 500 hp, 600 v.

Horsepower ratings are associated with particular voltages and number of phases; the switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some enclosed switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Enclosed motor circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

Switches with direct current horsepower ratings are intended for use with reduced voltage starting.

Switches which are marked "Suitable For Use On A Circuit Capable Of Delivering Not More Than _____ RMS Symmetrical Amps, _____ Volts Maximum; Use Class _____ Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short Circuit Current Of The Circuit" have been investigated for the additional rating indicated.

Most enclosed switches are also suitable for use as service switches. Such switches are marked "Suitable for Use as Service Equipment."

Some enclosed switches incorporate neutrals factory bonded to the enclosure. Such switches are marked, "Suitable Only For Use As Service Equipment."

Enclosed switches marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Some Enclosed Switches are listed as service switches under "Service Equipment."

Some Enclosed Switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

3-pole enclosed switches rated 1200 amps and not provided with automatic tripping means for use with ground fault protection and marked for use as service equipment are intended for continuous industrial processes if used on 3-phase, 4-wire delta systems having more than 150 v to ground.

Enclosed switches that are rain tight or rainproof are marked accordingly.

Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Controllers, Manual

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire where wire size Nos. 14-1 AWG are used and 75 C wire where wire size Nos. 1/0 AWG and larger are used.

Enclosed bolted pressure contact switches are listed under the category of "Fused Power Circuit Devices."

Some Listed enclosed switches in this category have been investigated for use aboard marine vessels over 65 ft in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259, (46CFR, Parts 110-113). Such enclosed switches are identified by a Listing Mark for marine vessels over 65 ft. in length.

Enclosed switches marked for marine use and also suitable for general use.

The Electrical Engineering Regulations of the United States Coast Guard classify marine enclosed switches as "Non-watertight," "Drip-proof," or "Watertight."

A "Drip-proof" marine enclosed switch is so constructed that falling moisture or dirt does not interfere with the successful operation of the equipment.

A "Watertight" marine enclosed switch is so constructed that water does not enter the enclosure when subjected to a stream of water.

Marine enclosed switches which are classed "Drip-proof" or "Watertight" are marked to indicate this fact.

Marine enclosed switch for use in corrosive locations is marked "Suitable For Use In Corrosive Locations."

The basic standard used to investigate products in this category is UL98, "Enclosed Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Enclosed Switch", "Enclosed Motor-Circuit Switch", "Marine, Enclosed Switch For Use On Vessels Over 65 Ft".

SWITCHES, KNIFE (WIOV)

This listing covers open type knife switches either with or without fuse holders for plug fuses or for 0-600 amp cartridge fuses having no current interrupting rating included in their marking; switches having individual bases designed for either front or rear wiring connection; and switch parts without bases designed for mounting on switchboards and panelboards. Switches may be single- or multiple-pole, and with or without quick-break or auxiliary contacts, except where such contacts are specifically required.

Knife switches without fuse holders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Knife switches are provided with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring.

"Knife switches are marked with a short-circuit current withstand rating."

Standard voltage ratings for knife switches are: 125, 250, 250 dc-500 ac, 600. Unless otherwise indicated, the rating includes both alternating and direct current.

Standard current ratings for knife switches are: 30, 60, 100, 200, 400, 600, 800, 1200, 1600, 2000, 2500, 3000, 4000, 5000, 6000.

"Switches with knife blade action but with external operating handles are covered as enclosed switches, dead front switches, service equipment or fused power circuit devices."

The basic standard used to investigate products in this category is UL363, "Knife Switches".

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Knife Switch".

SWITCHES, LOAD INTERRUPTER AND ISOLATING, OVER 600 V (WIQG)

This Listing covers enclosed medium voltage load interrupter and isolating switches having AC voltage ratings from 4.76 kV through 38 kV, with continuous current ratings up to 3000 amps. These switches are intended for installation in accordance with the requirements of the National Electrical Code. Load interrupter switches are rated 200 through 1200 amps and may be provided with or without fuses. Switches rated more than 1200 amps at any voltage and those rated more than 600 amps at 27 kV or greater are isolating only. These switches are available in either stationary or draw out versions.

These switches are generally three pole devices, however some switches may be one- or two-pole. Enclosures may be either ventilated or nonventilated.

An enclosure which has been investigated to determine that it is rainproof is marked "Rainproof", "Outdoor" or "3R".

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended for use in areas accessible to qualified personnel only.

Unless specifically marked otherwise, these switches are intended for use on three phase circuits where the nominal voltage to ground is 0.58 times the line to line voltage.

Switches may or may not be provided with magnetizing current interrupting ratings.

Switches may or may not be provided with cable charging ratings.

Load interrupter switches are marked with a fault close rating. They should not be used on circuits having available fault currents in excess of the fault close rating. When provided with some fuses it may be necessary for the supply circuit to have an available fault current that is less than the fault close rating of the switch due to the limited interrupting ability of the fuses. Switches are marked as follows on the outside of the enclosure "Suitable for use on a circuit capable of delivering not more than _____ RMS Symmetrical Amps".

These switches may consist of a single free standing vertical section or they may consist of several abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus each vertical section is marked with the ampacity of the horizontal bus in amps. Switches that are intended to be part of such a line up are provided with a "_____ of _____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing a UL Listing Mark) and the first blank indicates the position (reading from left to right) of the vertical section bearing the marking.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

The basic standards used to evaluate these products are ANSI C37.58-1990 (Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear); ANSI/IEEE C37.20.3-1987 (American National Standard Metal-Enclosed Interrupter Switchgear) and ANSI C37.57-1990 (Metal-Enclosed Interrupter Switchgear Assemblies-Conformance Testing).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark covers only the sections included in the assembly. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Isolating Switch", "Metal-Enclosed Interrupter Switchgear", "Metal Enclosed Switchgear", "Load Interrupter Switch" or "Load Interrupter Switchgear".

SWITCHES, MOLDED CASE (WJAZ)

This listing covers both fused and unfused molded case switches.

No overcurrent protection is provided by the unfused switches and they are MARKED with a SHORT-CIRCUIT CURRENT WITHSTAND RATING.

The fused switches have one or more replaceable fuses to provide overcurrent protection and they are MARKED with a SHORT-CIRCUIT CURRENT INTERRUPTING RATING.

The maximum voltage rating of a molded case switch is 600 volts.

The unfused switches are tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked, "Continuous load current not to exceed 80 percent of the rating of fuses employed."

Unfused switches are tested under overload conditions at six times amp rating cover motor circuit applications and are suitable for use as motor circuit disconnects per Section 430-109 of the National Electrical Code.

Fused switches are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

Unfused two-pole molded case switches which are marked to indicate suitability for use on 3-phase circuits have been investigated and found suitable for controlling 3-phase, corner grounded delta circuits.

The switches listed herein are for use with copper conductors, unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any markings on terminal connectors and are readily visible.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire where wire size Nos. 14-1 AWG are used and 75 C wire where wire size Nos. 1/0 AWG and larger are used.

Molded case switches without enclosures are intended for use in Listed circuit breaker enclosures, or as a part of other Listed equipment or where open type molded case switches are acceptable.

Some unfused switches have a release mechanism that causes the switch to open automatically to protect itself in the event of a short circuit current fault. Such switches are marked to indicate that they may open.

Some enclosed molded case switches may be provided with ground fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Some enclosed molded case switches are marked as suitable for use as service equipment.

Listed molded case switches may be mounted in any position.

Line and load markings on a molded case switch are intended to limit connections there-to as marked.

Molded case switches may be equipped with factory installed accessories such as alarm and auxiliary switches, remotely energized electrically operated trip mechanisms, and electrical operators.

The basic standard used to investigate products in this category is UL489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Molded Case Switch" or "Fused molded case switch". The words "Molded Case Switch" may be abbreviated "M.C.S." in all of the product names permitted above (e.g. "Fused M.C.S.").

SWITCHES, PHOTOELECTRIC (WJCT)

This listing covers photoelectric switches and motion detectors for use in nonindustrial locations, rated 250 V, 2000 VA, maximum. Switches which have been investigated for the control of tungsten filament lamp loads are marked "Tungsten". Switches which have been investigated for the control of fluorescent lamp ballast loads are marked "Ballast".

Investigation of devices listed as "Rain tight" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Photoelectric switches and motion detectors designed to provide protection for mercantile premises, stock rooms, safes, vaults, etc. are covered under Intrusion Detection Units (ANSR) in the Security Equipment Directory.

See Industrial Control Equipment for the Listing of industrial types of photoelectric switches and motion detectors.

These switches have been tested to determine their acceptability for continuous operation at their marked load rating.

The basic standard used to investigate products in this category is UL773A, "Nonindustrial Photoelectric Switches for Lighting Control".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products

includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photoelectric Switch" or "Motion Detector Switch" ..

Photo Controls, Plug-in, Locking Type (WJFX)

This listing covers plug-in locking type photo controls for use on outdoor type electric lighting fixtures which are used for both street lighting and area lighting (lighting of parking lots and similar applications).

Unless marked specifically "Tungsten" or "Ballast" these products are suitable for use with either type of fixture, rated not more than the rating of the photo control. Voltage rating is 480 v, ac, maximum.

The basic standard used to investigate products in this category is UL773, "Plug-In Locking-Type Photocontrols for Use with Area and Roadway Lighting".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Photocontroller", "Photocontroller Shorting Plug", "Photocontroller Open Circuit Plug".

SNAP SWITCHES (WJQR)

General Use Snap Switches are so constructed that they can be installed in flush device boxes or on outlet box covers or otherwise used in connection with wiring systems recognized by the National Electrical Code.

Door switches are evaluated for use only in combination with a specific switch, special switch box and cover. See Switches, Door (WLFV).

Flush snap switches that have been investigated for use without separate outlet boxes with Types NM and MNC cable in accordance with the National Electrical Code are so identified by specific marking on the carton in which they are packed.

Snap switches have not been investigated for switching a load between two alternate sources of supply. Double throw enclosed switches (see Switches, Enclosed [WIA]) or switches Listed as transfer switches (see Switches, Miscellaneous [WPZX] and Emergency Lighting and Power Equipment [FTBR]) should be used for this purpose.

Multi-pole, general use snap switches have not been investigated for more than single circuit operation unless marked "2-circuit" or "3-circuit."

General use snap switches are classified into two categories: AC-DC General Use and AC General Use. AC general use switches are marked "AC" to limit their use to alternating current circuits. AC-DC general use switches are not so limited; no such marking is required or generally provided.

See additional information under this category covering other conditions of use for each type.

AC-DC General Use Snap Switches

The standard amp and voltage ratings for an AC-DC general use snap switch for controlling direct or alternating current circuits are given in Table I below. While many of these snap switches will operate successfully on circuits that have some reactance, in general, an inductive load should not exceed one-half the amp rating of the switch at the voltage involved. However, some of these snap switches are marked with additional horsepower ratings at one or more voltages which indicate that a switch which is so marked has been tested for the control of a motor of the horsepower and voltage rating indicated. Such a snap switch has been tested for the control of tungsten-filament lamp loads and is marked with the letter "T" as part of the suitable tungsten-filament lamp load rating at 125 V.

TABLE I
SNAP SWITCH RATINGS IN AMPERES CORRESPONDING TO DIRECT CURRENT POTENTIALS

125 V	250 V	600 V	125 V	250 V	600 V
—	—	1	—	10	—
3*	1*	—	20	10	—
—	—	2	—	20	10
5*	2*	—	—	—	20
—	—	3	—	20	—
5 or 6	3	—	30**	20	—
—	5	3	40	20	—
—	—	5	—	30	20
—	5	—	—	—	30
10	5	—	—	30	—
—	10	5	60	30	—
—	—	10	—	60	—

The above ratings apply equally when these switches are used on alternating current circuits.

*These dual ratings may be assigned only to a three-way, four-way, two-circuit, three-circuit, or a fixture switch.

**A panelboard switch may be rated at 30 A, 125 V, without the corresponding 250 V rating.

A-C General Use Snap Switches

An A-C general use snap switch has a marked current and voltage rating only for alternating current which is one of the ratings given in Table II, and is either for installation in a flush device box (Flush Snap Switch) or is mounted on an outlet box cover or is for surface mounting (Surface Snap Switch).

A-C general use snap switches are tested for the control of resistive, inductive (including electric discharge lamp) and tungsten-filament lamp loads at 120 V up to the full current rating of the switch, and for motor loads up to 80% of the amp rating of the switch but not exceeding 2 hp.

TABLE II
A-C SNAP SWITCH RATINGS IN AMPERES CORRESPONDING TO ALTERNATING CURRENT POTENTIALS

120 V A-C	120-277 V A-C	277 V A-C
15	—	—
20	—	—
30	—	—
—	15	—
—	20	—
—	30	—
20	—	15
30	—	15
30	—	20

Snap switches rated 240 or 250 V that are intended for use on circuits involving a nominal potential to ground of 120 or 125 V, respectively, are tested on such circuits and are marked with the voltage rating 240 or 250 (no underlining). Snap switches rated 240 or 250 V that are suitable for use at full potential to ground are marked with the voltage rating 240 or 250 (double underlining). Snap switches having voltage ratings other than 240 or 250 V are tested on circuits involving full rated potential to ground.

Terminals of 15 A and 20 A switches not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors.

Terminals of switches rated 30 A and above not marked "AL-CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL-CU" are for use with aluminum, copper and copper-clad aluminum conductors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED."

Snap Switches and Fuseholder, Combination (WKDZ)

This listing covers combinations of either plug or cartridge-type fuseholders and snap switches.

For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL20, "General-Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List.").

Switches, Door (WLFV) USE

This category covers snap switches for use in door jambs.

This category covers an assembly consisting of a switch, special switch box and cover. The special switch box is not an outlet box. It is only intended to terminate the switch leads. It is not intended for any other type of field wiring.

PRODUCT MARKINGS

Listed door switches are marked with the Listee's name or trademark and electrical rating in a location where readily visible after installation. An AC only door switch, if rated in wattage, is marked "For use with incandescent lighting only" where visible after installation.

The catalog designation is marked on the assembly, on the package, or on a stuffer sheet packaged with each assembly.

ADDITIONAL INFORMATION

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For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ)..

REQUIREMENTS

The basic standard used to investigate products in this category is UL 20, "General Use Snap Switches."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the assembly is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED."

Switches, Fixture (WLTT)

This listing covers switches for use in electric fixtures, fixture canopies and portable lamps.

For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL20, "General-Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List.").

**Switches, Fixtures, Socket and Special
Mechanism Types (WMHR)**

The basic standard used to investigate products in this category is UL20, "General Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Fixture Snap Switch", "Fixture Switch".

Switches, Flush (WMUZ)

This listing covers snap switches for mounting in flush device boxes and also switches that have been investigated for use without separate outlet boxes with Types NM and NMC cable. For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL20, "General Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List.").

Switches, Pendant (WNIX)

This listing covers pendant switches, through-cord switches, and combination pendant switches with attachment plug receptacles.

For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL20, "General Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List.").

**Switches, Pendant, Socket and Special Mechanism
Types (WNWV)**

The basic standard used to investigate products in this category is UL20, "General-Use Snap Switches".

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Pendant Switch".

Switches, Surface (WOKT)

This listing covers snap switches, for surface mounting, unless otherwise stated in the individual listing.

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For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL20, "General Use Snap Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", (or "List.").

TRANSFER SWITCHES (WPTZ)

This category covers automatic and non-automatic transfer switches, including associated control devices, with maximum ratings of 600 volts AC and transfer switches over 600 volts ac but not more than 38kV.

Transfer switches and by-pass switches which have been investigated without regard to the enclosure in which they are mounted have the Listing Mark applied to the switch panel. When the Listing Mark is applied to the enclosure of an enclosed transfer switch or by-pass switch it indicates the Listing of the complete enclosed assembly.

Transfer switches rated 600 volts and less which have been investigated for their suitability for use as service equipment are marked, "SUITABLE FOR USE AS SERVICE EQUIPMENT."

Transfer switches are required to be designed so that the load cannot remain simultaneously disconnected from both the normal and alternative sources when either or both sources are available, except that transfer switches marked, "SUITABLE FOR USE AS SERVICE EQUIPMENT" are provided with accessible means to independently disconnect both the normal and alternate sources.

Automatic transfer switches transfer a common load from a normal supply to an alternate supply in the event of failure of the normal supply, and automatically return the load to the normal supply when the normal supply is reestablished.

Additional sensing devices which may initiate or delay transfer have been evaluated in accordance with the manufacturer's marked operating values.

Automatic Transfer Switches may have a switching contact to initiate the starting of an engine generator set.

Transfer Switches have been investigated for load switching and inrush capability and for a number of cycles of operation based on their intended use which in the case of an automatic transfer switch is expected to include scheduled test operations switching full load.

Listed transfer switches without enclosures are for use as part of other equipment or where open type devices are acceptable.

Transfer Switches without integral overcurrent protective devices are suitable for continuous use at 100 percent of rated current. Transfer switches incorporating integral overcurrent devices are suitable for continuous use at 100 percent of rated current unless restricted to use at 80 percent of rated current as indicated by the marking, "CONTINUOUS LOAD CURRENT NOT TO EXCEED 80 PERCENT OF SWITCH RATING," on the switch.

Transfer switches are rated in amps and are generally considered to be suitable for total system transfer, which includes control of motors, electric-discharge lamps, electric-heating loads, and tungsten-filament lamps within the amp rating marked on the nameplate.

Unless marked otherwise, Transfer Switches rated 100 amps or less are suitable for use on circuits having available fault currents not greater than 5000 amps rms symmetrical. Transfer Switches rated more than 100 amps are suitable for use on circuits having an available fault current of 10,000 amps rms symmetrical or 20 times the transfer switch rating whichever is greater.

Transfer switches marked with a short circuit rating without reference to an overcurrent device by manufacturer and catalog number has been tested for a minimum of 3 electrical cycles and is intended for use with a Listed molded case circuit breaker without a short-time function.

Transfer Switches having manual operators accessible only by opening the enclosure, are not intended to be manually operated under load.

Some transfer switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking such as on a wiring diagram.

Transfer switches without integral overcurrent protection, are marked to indicate the maximum rating of overcurrent protection to be provided ahead of the transfer switch.

Transfer switches as Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is indicated on a wiring diagram or other readily visible location.

Unless the device rated 600 volts and less is marked otherwise, the wiring space and terminations are based on 60 C wire for switches rated 100 amps or less and 75 C for switches rated more than 100 amps.

Unless the transfer switch rated over 600 volts is marked otherwise, the wiring space and terminations are based on the use of Type MV90 con-

ductors. The ampacity of Type MV90 conductors is specified in Tables 310-75 and 310-76 of the National Electrical Code.

The basic standard used to investigate products in this category is UL1008, "Transfer Switch Equipment".

Accessories, Transfer Switch (WPVQ)

GENERAL

This category covers bypass switches which permit testing and maintenance of emergency system components that could not be otherwise maintained without disruption of important functions. The bypass switching sequence is manually initiated.

The transfer and bypass/isolation switch for use in emergency systems consists of a transfer switch suitable for emergency systems, and with the transfer switch isolated or disconnected the bypass/isolation switch functions as an independent nonautomatic transfer switch and allows the load to be connected to either power source.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1008, "Transfer Switch Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Transfer Switch Accessory," "Transfer and Bypass/Isolation Switch," "Bypass/Isolation Switch," "Bypass/Transfer Switch" or "Transfer and Bypass/Isolation Switch for Emergency Systems."

Automatic Transfer Switches for Use in Emergency Systems (WPWR)

This listing covers automatic transfer switches intended for use in Emergency Systems as contemplated by Articles 517 and 700 of the National Electrical Code. These transfer switches are also suitable for use in Standby Systems in accordance with Articles 701 and 702 of the National Electrical Code.

See additional information under "Transfer Switches", Guide WPTZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch For Emergency Systems".

Automatic Transfer Switches for Use in Optional Standby Systems (WPXT)

This Listing covers automatic transfer switches intended for use in Optional Standby Systems in accordance with Article 702 of the National Electric Code.

See additional information under "Transfer Switches", Guide WPTZ.

These products have been investigated with overload protection for the control circuits provided within the controller enclosure or by the installer as specified by the wiring diagram.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch For Use in Optional Standby Systems."

Automatic Transfer Switches, Over 600 V (WPYC)

USE

This category covers automatic transfer switches intended for use in systems rated more than 600 V ac. An automatic transfer switch automatically transfers a load to another source of power when the original source fails and will automatically retransfer the load to the original source under desired conditions.

SWITCH TYPES

These switches may be of the fixed preferential, nonpreferential or selective-preferential type.

A fixed-preferential type switch automatically transfers to the original source when it is available.

A nonpreferential type switch retransfers the load to the original source only when the second or emergency source fails.

A selective-preferential type switch is a type in which either source may be selected as the preferred source and which will retransfer the load to the preferred source upon its reenergization.

RATINGS

These switches are rated up to 1200 A at over 600 V, up to 38 kV.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1008, "Transfer Switch Equipment," ANSI C37.20.4, draft 21 dated 6-1-94, "Proposed Standard for Indoor AC Medium-voltage Switches for Use in Metal-enclosed Switchgear" and/or ANSI C37.54, "Conformance Test Procedures for Indoor Alternating Current Medium-voltage Circuit Breakers Applied as Removable elements in Metal-enclosed Switchgear."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch."

Nonautomatic Transfer Switches (WPYV)

This listing covers nonautomatic transfer switches intended to transfer a common load from a normal supply to an alternate supply of an equipment system in accordance with Sections 517-34 and 517-43 or an optional stand-by system in accordance with Article 702 of the National Electrical Code.

See additional information under "Transfer Switches", Guide WPTZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Non-Automatic Transfer Switch".

SWITCHES, MISCELLANEOUS (WPZX)

Miscellaneous switches with amp ratings are intended for general use.

Switches with horsepower ratings are suitable for use in motor circuits.

This listing covers switches either with or without fuse holders for plug fuses or for cartridge fuses.

Miscellaneous switches without fuse holders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Miscellaneous switches which are marked "Suitable For Use On A Circuit Capable of Delivering Not More Than _____ RMS Symmetrical Amps, _____ Volts Maximum; Use Class _____ Fuses Having An Interrupting Rating of No Less Than The Maximum Available Short Circuit Current of The Circuit", have been investigated for the additional rating indicated when using Class J, Class L or other fuse designed so as to prevent the use of a fuse of lower interrupting rating. This rating on a switch does not qualify the equipment in which it is mounted for use on circuits capable of delivering fault currents higher than that for which the equipment is suitable.

Ratings of listed Miscellaneous Switches are limited to 3600 amp, 500 hp, 600 v. Switches rated more than 1200 amp are intended for isolating use only. Switches rated 800 or 1200 amp at more than 250 v are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked "For Isolating Use Only — Do Not Open Under Load."

Horsepower ratings are associated with particular voltages and number of phases; the switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Miscellaneous Switches listed with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for a-c ratings and at four times motor full load running current for d-c ratings.

Some Miscellaneous Switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Class CTL Miscellaneous Switches may be identified by the words "Class CTL" or "CTL" on the switch as part of the marking.

Class CTL Miscellaneous Switches have physical size, configuration or other means which in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more switch poles than the number for which the assembly is designed and rated.

Some Miscellaneous Switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

The basic standard used to investigate products in this category is UL98, "Enclosed Switches".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fused Switch", "Miscellaneous Switch", "Remote Control Switch" or other appropriate product name.

SWITCHGEAR ASSEMBLIES, METAL ENCLOSED, LOW-VOLTAGE POWER CIRCUIT BREAKER TYPE (WUTZ)

This listing covers Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear rated up to 600 volts ac, nominal.

These switchgear assemblies are completely enclosed on all sides and top with sheet metal (except for ventilation openings and inspection windows) and may contain the following: (1) low voltage power circuit breakers, either fused or unfused; (2) bare and/or insulated bus bars and connections; (3) instrument and control power transformers; (4) instruments, meters and relays; and (5) control wiring and accessory devices.

The low voltage power circuit breakers are contained in individual grounded metal compartments and are controlled either remotely or from the front of the enclosure. The circuit breakers may be stationary or of the draw out type.

These switchgear assemblies may consist of a single vertical section housing one or more individual low voltage power circuit breaker compartments or auxiliary compartments, along with the associated bus bar structure, or may consist of several abutting sections interconnected by horizontal buses.

The auxiliary compartments may house such auxiliary equipment as potential transformers, control power transformers, or other miscellaneous devices.

These switchgear assemblies are marked with the following ratings or with a reference to a drawing which is included with the product and marked with the ratings: (1) rated maximum voltage; (2) rated frequency; (3) rated insulation level; (4) rated continuous current; (5) rated short-time current; (6) rated short circuit current.

Low voltage power switching devices used in these switchgear assemblies are suitable for continuous use at 100 percent of their continuous current rating.

The marking "Suitable for use as Service Equipment" appears on each switchgear section or assembly optionally intended for use at a service.

A switchgear section marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Generally this switchgear is shipped without wire connectors and the bus bar terminations are provided with standard bolt hole patterns. The suitability of the wire connectors installed must be determined by the local inspection authorities at the time of final inspection.

A switchgear section that has been investigated to determine it is rainproof is marked "Rainproof".

The individual power circuit breaker compartments or adapters are intended to accommodate a low voltage power circuit breaker and are marked to indicate the type(s) of circuit breaker that may be installed.

Individual auxiliary compartments are intended to house control components such as meters, instrument and/or control power transformers, and the like.

Low voltage power circuit breaker switchgear assemblies are generally provided with shop drawings or the like that include circuit and connection diagrams of the assembly, continuous current ratings of the main and section busses, details of control and ground fault protection (if provided) circuits, etc.

The basic standards used to investigate products in this category are UL1558, "Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear" and ANSI C37.20.1.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and one of the following product names as appropriate: "Low-Voltage Power Circuit Breaker Switchgear Section", "Low-Voltage Power Circuit Breaker Compartment", "Low-Voltage Power Circuit Breaker Auxiliary Compartment".

The Listing Marks for Low-Voltage Power Circuit Breaker Switchgear Sections also included the marking, "_____ of _____". The first

space shall be stamped with a number indicating the position that the section occupies in the series of sections constituting the switchgear assembly. The latter space shall be stamped with the total number of sections in the switchgear assembly. Only those sections and compartments that bear the Listing Mark are covered under service of UL.

SWITCHGEAR, GAS INSULATED TYPE, OVER 600 V (WVEK)

GENERAL

This category covers indoor medium-voltage switchgear where gas, typically sulfur hexafluoride (SF₆), is used as the insulating medium. The term "indoor" does not preclude the use of this equipment in outdoor enclosures, but rather defines the class of equipment. This equipment includes circuit breakers that are specifically intended to provide feeder or branch-circuit overcurrent protection. This equipment is not intended for use as service entrance equipment. These devices are intended for installation in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code."

CIRCUIT BREAKERS

The circuit breakers are three-pole devices, fixed, trip-free. Interruption may take place in a gas-filled chamber or in a vacuum interrupter that is in a gas-filled chamber. Each circuit breaker pole may be housed separately.

Each circuit breaker is connected to an isolating/grounding switch that can connect the circuit breaker to the circuit, disconnect the circuit breaker, or ground the load circuit through the circuit breaker.

Circuit Breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a "close-and-latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amperes. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amperes that is applicable at the maximum rated voltage. These circuit breakers are also provided with a "K" factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. The circuit breaker may interrupt a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max" by the same factor, or at a lower voltage, as depicted in Illustration 1 of Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH).

Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

GAS-INSULATED SWITCHGEAR

This switchgear may consist of several gas-filled compartments connected together. Gas-filled compartments are isolated from each other by gas seals. The compartments are electrically connected together and grounded. A compartment may house a circuit breaker, a length of bus, or a switch. A dual bus system, with isolating switches, may be provided.

A vertical section may consist of a circuit breaker, a switch, a bus compartment and a control compartment. A vertical section may be a single freestanding section or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus.

Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Listing Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Listing Mark.

Auxiliary equipment such as potential transformers and current transformers are factory installed. Other auxiliary equipment such as protective relays and the like are separately enclosed within the switchgear. They are not typically in gas-insulated compartments.

The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically panel mounted or located behind a dead front.

Gas-insulated Switchgear Ratings

Switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amperes. This marking shall appear on each vertical section bearing the UL Listing Mark.

ENCLOSURES

The standard enclosure for the parts operating at medium voltage consists of the metal housing that contains the gas-insulating medium. The enclosures are intended for indoor applications.

An additional enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." These enclosures may be either

nonventilated or ventilated. Enclosures intended for outdoor use are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI C37.20.2-1987, "Metal-Clad and Station-Type Cubicle Switchgear," ANSI C37.54-1987, "Conformance Test Procedures for Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Clad Switchgear Assemblies" and ANSI C37.55-1989, "Metal-Clad Switchgear Assemblies - Conformance Test Procedures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed and any installed fixed circuit breakers; it does not cover other vertical sections included in the assembly, or removable circuit breakers.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Insulated Switchgear."

TEMPERATURE-INDICATING AND REGULATING EQUIPMENT (XAPX)

Temperature-indicating and regulating equipment is Listed with a maximum rating of 600 V.

These listings cover electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses, intended to be employed on lighting and power circuits in ordinary locations in accordance with the National Electrical Code. These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control, or equipment or appliance operation, etc.

These controls with a duty cycle have been tested to determine their acceptability for continuous operation at their marked rated load, unless marked.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in "pilot duty" is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75-80 per cent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

Control Panels

An "M1" or "M2" marking indicates the following manual reset functions are provided:

"M1" - Controls requiring manual reset but may function automatically to reset to the "closed" position after safe operating conditions have been restored, if the reset means is held in the "reset" position.

"M2" - Controls requiring manual reset that will not permit the control to function automatically, if the reset means is held in the "reset" position.

Room thermostats intended for the direct control of electric space heating, equipment that is to be permanently connected electrically has been subjected to switching tests at increased voltage, of extended duration and with a slow rate of temperature change. Such room thermostats with marked "off" positions open all poles.

Equipment identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in the guide information at the front of this directory (AALZ).

A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the National Electrical Code for the Class 2 circuit.

A control marked to indicate use in agricultural buildings in accordance with Article 547 of the National Electrical Code has been tested in the environmental conditions of Paragraph 547-1(a) and 547(b) of the National Electrical Code.

The listings of motor operators do not include valves or other connected mechanical loads.

Safety controls for gas and oil fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX).

Controls for refrigeration and air conditioning (except remote, wall-mounted room thermostats) are Listed in the Electrical Appliance and Utilization Equipment Directory as "Refrigeration Controllers".

The basic standard used to investigate products in this category is UL 873, "Electrical Temperature-Indicating and Regulating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Temperature Indicating Equipment", "Temperature Regulating Equipment", "Temperature Controlling Relay", or other appropriate product name.

TEMPERATURE-INDICATING AND REGULATING EQUIPMENT, ELECTRICAL (XATJ)

GENERAL

This category covers temperature-indicating and regulating equipment with a maximum rating of 600 V and includes electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses, intended to be employed on lighting and power circuits in unclassified (ordinary) locations in accordance with NFPA 70, "National Electrical Code" (NEC). These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control or equipment or appliance operation, etc.

These controls with a duty cycle have been tested to determine their acceptability for continuous operation at their marked rated load, unless marked.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in "pilot duty" is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amperes is tested with an inductive (75-80 percent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

The Listings of motor operators do not include valves or other connected mechanical loads.

PRODUCT MARKINGS

An "M1" or "M2" marking indicates the following manual reset functions are provided:

M1 - Controls requiring manual reset but may function automatically to reset to the "closed" position after safe operating conditions have been restored, if the reset means is held in the "reset" position.

M2 - Controls requiring manual reset that will not permit the control to function automatically, if the reset means is held in the "reset" position.

Room thermostats intended for the direct control of electric space heating, equipment that is to be permanently connected electrically has been subjected to switching tests at increased voltage, of extended duration and with a slow rate of temperature change. Such room thermostats with marked "off" positions open all poles.

Equipment identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

A control marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC has been tested in the environmental conditions of 547-1(a) and 547(b) of the NEC.

RELATED PRODUCTS

Safety controls for gas and oil fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Con-

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trols, Primary Safety (MCCZ) or Switches (MFHX) in the Heating, Cooling, Ventilating and Cooking Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 8730-1, "Electrical Controls for Household and Similar Use; Part 1: General Requirements" together with the following appropriate Part 2 Standards:

UL 8730-2-3, "Particular Requirements for Thermal Protectors for Ballasts for Tubular Fluorescent Lamps."

UL 8730-2-4, "Particular Requirements for Thermal Motor Protectors for Motor-Compressors of Hermetic and Semi-Hermetic Type."

UL 8730-2-6, "Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements."

UL 8730-2-9, "Particular Requirements for Temperature Sensing Controls."

UL 8730-2-14, "Particular Requirements for Electric Actuators."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Ballast Thermal Protector," "Thermal Compressor Motor Protector," "Pressure Sensing Control," "Temperature Sensing Control," "Electric Actuator," "Temperature Indicating Equipment," "Temperature Regulating Equipment," "Temperature Controlling Relay" or other appropriate product name as shown in the individual Listings.

**TEMPORARY LIGHTING STRINGS
(XBRT)****USE AND INSTALLATION**

This category covers temporary lighting strings rated 20 A, 125 V, intended for use indoors and outdoors to provide temporary illumination in accordance with Article 527 of NFPA 70, "National Electrical Code."

Temporary lighting strings consist of a factory assembly of flexible cord, cable or insulated open conductors incorporating a series of Edison base lampholders provided with lamp guards. The flexible cord may be terminated at one end with an attachment plug, for connection to the source of supply, and with a cord connector at the opposite end. If an attachment plug is not provided, the temporary lighting string is provided with instructions for proper connection to the source of supply.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Temporary Lighting String."

**RELOCATABLE POWER TAPS
(XBYS)****USE AND INSTALLATION**

This category covers relocatable power taps rated 250 V ac or less, 20 A or less, intended for indoor use as relocatable multiple outlet extensions of a branch circuit to supply laboratory equipment, home workshops, home movie lighting controls, musical instrumentation, and to provide outlet receptacles for computers, audio and video equipment, and other equipment. They consist of an attachment plug and a length of flexible cord terminated in an enclosure in which one or more receptacles are mounted. They may, in addition, be provided with fuses or other supplementary overcurrent protection, switches, suppression components and/or indicator lights in any combination, or connections for cable, communications, telephone and/or antenna.

Relocatable power taps are intended to be directly connected to a permanently installed branch circuit receptacle. Relocatable power taps are not intended to be series connected (daisy chained) to other relocatable power taps or to extension cords.

Relocatable power taps are not intended for use at construction sites and similar locations.

Relocatable power taps are not intended to be permanently secured to building structures, tables, work benches or similar structures, nor are

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they intended to be used as a substitute for fixed wiring. The cords of relocatable power taps are not intended to be routed through walls, windows, ceilings, floors or similar openings.

Relocatable power taps are not intended for use with medical, dental, or health care facilities equipment.

RELATED PRODUCTS

For relocatable power taps employing cord sets provided with leakage current detection and interruption, see Cord Sets with Leakage Current Detection and Interruption (ELGN).

For portable ground-fault circuit interrupters, see Ground-fault Circuit Interrupters (KCXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1363, "Relocatable Power Taps."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Relocatable Power Tap," "Power Tap" or "Outlet Strip."

**TEMPORARY WIRING DEVICES,
EXHIBITION HALL (XCCD)**

This listing covers temporary wiring devices intended for use indoors in exhibition halls where power is required to operate cord connected equipment at individual display booths, in accordance with Article 305 of the National Electrical Code.

Exhibition Hall Temporary Wiring Devices are portable enclosures provided with an integral type SE or equivalent extra hard usage power supply cord, or provided with an inlet to be used with a Listed extra hard usage cord set for connection to a branch circuit. Exhibition Hall Temporary Wiring Devices may be designed to permit the connection of additional temporary wiring devices for the purpose of distributing a number of receptacles throughout the exhibition hall, originating from a single source.

Exhibition Hall Temporary Wiring Devices contain one or more attachment plug receptacles. Receptacles that have a current rating less than the branch circuit to which the device is connected are provided with overcurrent protection in the form of fuses, circuit breakers, or fused switches. The device enclosures are of sufficient strength and rigidity so as to resist damage or reduction of internal spacings that may result from frequent relocation or physical abuse.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Hall Temporary Wiring Device".

TERMINATION BOXES (XCKT)**GENERAL**

This category covers termination boxes rated 600 v or less that (1) consist of lengths of busbars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both, and (2) are intended to be used in accordance with NFPA 70, "National Electrical Code." Termination boxes are investigated for use on the line or load side of service equipment.

Termination boxes may have knockouts or openings for the connection of cable fittings, conduit or electrical metallic tubing. They may also have openings for connection with openings in other equipment, such as meter sockets, panelboards, switch or circuit breaker enclosures, wireways, raceways and the like.

This category also covers termination bases to be field installed in termination boxes, and termination boxes in which termination bases are to be field installed.

Termination boxes are Listed for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Termination boxes intended for use with field-installed wire connectors are marked stating which pressure terminal connectors, component terminal assemblies or termination bases are to be used.

Factory-installed field wiring connectors requiring the use of a special tool (such as crimp connectors) are provided with instructions concerning the proper tool to be used for termination of conductors.

Termination boxes are marked with their short circuit current ratings in RMS symmetrical amps.

Termination boxes are marked with an enclosure type as described in Electrical Equipment for Use in Ordinary Locations (AALZ).

A termination box in the form of a mounting post is intended to be mounted in concrete at grade level or below or is intended to be secured to some other mounting support. A mounting post is marked with a grade level line to which the post should be encased.

A mounting pedestal is intended to be mounted on a concrete slab.

A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities.

Unless marked otherwise, a mounting post or pedestal is intended to be self-supporting, and is not intended to serve as the support of a mast for overhead wiring.

RELATED PRODUCTS

Equipment connected only by busbars to both input and output circuits and equipment known as "end cable tap boxes" are covered under Busways and Associated Fittings (CWFT). Equipment containing switching devices, relays or overcurrent devices is covered under the appropriate category; see Switchboards (WEIR), Industrial Control Equipment (NIMX) or Panelboards (QEUY).

Posts or pedestals intended to support and feed distribution equipment such as a power outlet, panelboard, or circuit breaker enclosure are covered under Mounting Posts and Pedestals for Distribution Equipment (PUPR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1773, "Termination Boxes."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Termination Box" or the name of the specific type of product as shown in the individual Listings.

TRAFFIC SIGNAL CABLE CLASSIFIED IN ACCORDANCE WITH IMSA SPECIFICATIONS (XNTL)

GENERAL

This category covers cable investigated in accordance with International Municipal Signal Association Inc. specifications. The cable is intended for installation as aerial cable or in underground conduit as part of a traffic signal system. This cable employs a color-code scheme that permits a conductor with green insulation to be used for other than grounding purposes. This cable has not been evaluated for flammability. This cable is not suitable for use as a substitute for cable or wiring systems covered in NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products consists of the statement "Classified by Underwriters Laboratories Inc. in accordance with IMSA Specifications XX-X" together with a control number and the product name "Traffic Signal Cable." In addition, the Classification Mark may include the UL symbol (as illustrated in the Introduction of this Directory).

TRANSFORMERS (XNWX)

TRANSFORMERS, CLASS 2, CLASS 3 (XOKV)

These transformers are intended for use in Class 2 or Class 3 remote control and signal circuits in accordance with Article 725 of the National Electrical Code.

This listing covers transformers with secondary voltage limits of 30 volts rms for Class 2 and 150 volts rms for Class 3. Class 2 transformers with open circuit secondary voltages over 15 volts rms are marked "Class 2 not

wet, Class 3 wet" to indicate that where wet contact is likely, Class 3 wiring methods are to be used in accordance with Article 725 of the National Electrical Code.

Where higher temperature rated field wiring is required, the transformer is marked "Use wire rated for at least (75 or 90)C".

Some transformers with multiple secondary windings are marked "Warning" and the following or equivalent wording: "Risk of electric shock or fire, do not interconnect secondary windings".

Transformers intended for installation with open wiring or concealed knob and tube wiring in accordance with Articles 320 and 324 of the National Electrical Code, are marked "Suitable for use in accordance with Articles 320 and 324 of the NEC".

Transformers intended for mounting in a conduit knockout and that have no means for maintaining a bonding path between the transformer and the equipment grounding conductor when the transformer is installed in a nonmetallic box are marked "Install in Metal Box Only".

Unless marked, the fire resistance of secondary circuit wiring provided as part of the transformer has not been evaluated for compliance with Section 725-38(b) of the National Electrical Code.

Direct plug-in Class 2 transformers are listed under Direct Plug-in Transformer Units, Guide EPBU in the Electrical Appliance and Utilization Equipment Directory.

The basic standard used to investigate products in this category is UL1585, "Class 2 and Class 3 Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Class 2 Transformer", "Class 2 not wet, Class 3 wet Transformer", "Class 3 Transformer". The word "Transformer" may be abbreviated "XFMR", "XFRMR" or "XFORMER".

TRANSFORMERS, DIMMERS (XOYT)

This listing covers dimmer type, air cooled, variable voltage autotransformers and reactors, intended for dimming portable electric lamps and electric lighting fixtures used in nonindustrial branch lighting circuits of not more than 120 v, and having overcurrent protection of not more than 20 amp. They are furnished in enclosures having means for conduit connection and may be provided with a control switch.

See Industrial Control Equipment, Miscellaneous Apparatus for listing of industrial type dimmers.

The basic standards used to investigate products in this category are UL506, "Specialty Transformers" and UL 508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Dimmer Transformer", "Tungsten Lamp Dimmer", "Fluorescent Lamp Dimmer", or other appropriate product name. The word "Transformer" may be replaced by the abbreviation "XFMR", "XFRMR". or "XFORMER".

TRANSFORMERS, DISTRIBUTION, DRY TYPE, OVER 600 V (XPFS)

USE AND INSTALLATION

This category covers dry-type distribution transformers, including solid cast and resin encapsulated transformers rated 69 kV class or less, single- and three-phase.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature.

These transformers are intended for installation in accordance with the requirements of NFPA 70, "National Electrical Code" (NEC).

Transformers having exposed live parts, such as at high voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1562, "Transformers, Distribution, Dry-Type - Over 600 Volts."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Distribution Transformer." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

The "Distribution Transformer" Listing Mark covers both the transformer and the enclosure.

TRANSFORMERS, DISTRIBUTION, LIQUID-FILLED TYPE, OVER 600 V (XPLH)

USE AND INSTALLATION

This category covers liquid-filled, distribution type, pad-mounted and substation type transformers, rated 69 kV class or less, single- and three-phase.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature.

These transformers are intended for installation in accordance with the requirements of NFPA 70, "National Electrical Code" (NEC).

Transformers having exposed live parts, such as at high voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS Sheets) available from the transformer manufacturer.

Transformers identified "FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL ELECTRICAL CODE (NEC)" are provided with a UL Classified "Less-Flammable Liquid" that has a fire point not less than 300°C. These transformers are marked to identify the product name and flammability rating of the liquid which is provided, whether the liquid may evolve flammable gases when decomposed by an electric arc (as applicable), and are marked with all use restrictions provided for in the Classification of the liquid. See Transformer Fluids (EOVK) and Dielectric Mediums (EOUV) for additional information. Use restrictions may include information such as limits on the overcurrent protection to be used in the transformer primary.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is IEEE C57.12.00-2000, "Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers." Additional standards used to investigate pad-mounted types are ANSI C57.12.22-1989, "Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 kVA and Smaller: High Voltage, 34,500 Grd/19,920 Volts and Below; Low-Voltage, 480 Volts and Below - Requirements," ANSI C57.12.26-1993, "Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, 34,500 Grd/19,920 Volts and Below; 2500 kVA and Smaller" and ANSI C57.12.28-1996, "Standard for Switchgear and Transformers, Pad-Mounted Equipment - Enclosure Integrity." Additional requirements used to investigate substation-type are contained in ANSI C57.12.13-1992, "Conformance Requirements for Liquid-Filled Transformers Used in Unit Installations, Including Unit Substations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Liquid-Filled Distribution Transformer." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

The "Liquid-Filled Distribution Transformer" Listing Mark covers both the transformer and the enclosure.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with standards or parts detailed below from standards of the National Fire Protection Association (NFPA). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking:

**ALSO CLASSIFIED FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER
IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL
ELECTRICAL CODE (NEC)
AND MARKED USE RESTRICTIONS ON THE TRANSFORMER**

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TRANSFORMERS, GAS TUBE SIGN (XPMR)

This listing covers air cooled transformers for use with display signs employing glass tubes containing inert gases as the illuminant.

A weatherproof transformer is marked with the word "Weatherproof" or the designation "WP."

Open core and coil transformers are intended for use only within metal enclosures of portable, indoor signs. Transformers provided with power supply cords are not suitable for use outdoors. Other transformers if suitable for indoor use only are so marked; unmarked designs are intended for outdoor use within a sign body or equivalent enclosure.

The basic standard used to investigate products in this category is UL506, "Specialty Transformers."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas-Tube-Sign Transformer."

TRANSFORMERS, GENERAL PURPOSE (XPTQ)

The transformers covered by this listing are of the compound filled, exposed core or open core and coil construction, (industrial control type), rated 600 v or less. Step-up, step-down, insulated, and autotransformer types as well as air cooled reactors are included. Autotransformers are so marked.

Transformers of the air cooled, dry, ventilated or nonventilated types are listed under Power And General Purpose Transformers, Dry-Type (XQNX). Reactors used for dimming, and variable voltage autotransformers are listed under Industrial Control Equipment-Miscellaneous Apparatus (NMTR), or (for nonindustrial types) under Dimmers (Transformers) (XOYT). Voltage regulators are listed under Power Supplies (QQFU). Ballasts for mercury lamps and for fluorescent lamps are listed under Electric Discharge Lamp Control Equipment (FKOT). Swimming pool transformers are listed under Swimming Pool and Spa Transformers (WDGV).

Open core and coil power transformers for use in industrial control equipment are included in this listing and are identified as "Industrial Control Transformers" by the Listing Mark.

Transformers covered under this category have been evaluated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present such as that which may occur with uninterruptible power supplies, data processing equipment and solid state motor speed controllers.

The transformer rating is based on installation in a maximum 25°C ambient unless otherwise marked.

A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode, as appropriate. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references as to where further connection detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to total load kVA. Elevated voltage is that situation in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding.

Some transformers are marked to specify a minimum distance to a wall.

General Purpose Transformers are provided with leads, or with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring. Wire binding screws or studs with cupped washers may be used for copper wire 10 AWG max.

Unless the equipment is marked otherwise, termination provisions are based on the use of 60C wire for size Nos. 14-1 AWG and 75C wire for size Nos. 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable special instructions are marked on the transformer.

The basic standard used to investigate products in this category is UL506, "Specialty Transformers."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Purpose Transformer," "Industrial Control Transformer," "Air Cooled Reactor," "Auto-Transformer", or other appropriate product name. The word "Transformer" may be abbreviated "XFMR," "XFRMR", or "XFORMER".

TRANSFORMERS, IGNITION (XPZZ)

This listing covers ignition transformers designed for use on gas or oil burning equipment where the acceptability of the combination has been

determined by Underwriters Laboratories Inc. The transformers are designed for connection to supply circuits operating at not over 600 v, and unless otherwise indicated in the individual listings are of the air cooled, step-up type.

Interchangeable transformers Listed as Class 6, 10, 12, or 14 have been investigated to determine that their ignition characteristics are such that they may be interchanged with other Listed transformers of like class and secondary grounding on Listed oil or gas burners employing single spark gaps without further ignition performance test.

Noninterchangeable transformers are for specific applications or include ignition characteristics which preclude their interchangeability and their application to gas or oil burning equipment shall be the subject of special study for each case.

The basic standard used to investigate products in this category is UL506, "Specialty Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Interchangeable Ignition Transformer", "Non-Interchangeable Ignition Transformer". A green background identifies the Listing Mark for interchangeable transformers; a red background identifies the Listing Mark for non-interchangeable transformer. The word "Transformer" may be abbreviated "XFMR", "XFRMR", or "XFORMER".

POWER AND GENERAL PURPOSE TRANSFORMERS, DRY TYPE (XQNX)

This category covers transformers of the air cooled dry, ventilated or nonventilated types rated 600 v or less; 500 kVA or less single phase; and 1500 kVA or less three phase. Step-up, step-down, insulated, and autotransformer types as well as air cooled reactors are included. Autotransformers are so marked.

The transformers and reactors are provided with leads, or with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring. The adequacy of the wire bending space in accordance with Article 373 of the National Electrical Code has not been determined and should be evaluated at the time of installation.

Unless the equipment is marked otherwise termination provisions are based on the use of 60C wire for size Nos. 14-1 AWG and 75C wire for size Nos. 1/0 AWG and larger.

Unless otherwise marked, transformers covered under this category have not been investigated for use where a significant nonsinusoidal current is present. Examples of equipment which may draw nonsinusoidal currents are uninterruptible power supplies, electronic ballasts, data processing equipment and solid state motor speed controllers.

Transformers that have been evaluated for use where significant nonsinusoidal current is present are marked, "Suitable for nonsinusoidal current load with K factor not to exceed _____", where the blank is filled in with one of the standard K factor ratings of 4, 9, 13, 20, 30, 40 or 50. (The K factor specified is the summation of the per unit rms current at harmonic "h" squared times the harmonic order squared). K factor rated transformers have not been evaluated for use with harmonic loads where the rms current of any single harmonic higher than the tenth is greater than 1/h of the fundamental rms current.

The transformer ratings are based on installation in a maximum 40C ambient unless otherwise marked.

Reactors used for dimming, and variable voltage autotransformers are listed under Industrial Control Equipment-Miscellaneous Apparatus, or (for nonindustrial types) under Dimmers (Transformer). Voltage regulators are listed under Power Supplies. Swimming pool transformers are listed under Swimming Pool Equipment. Ballasts for mercury lamps and for fluorescent lamps are listed under Electric Discharge Lamp Control Equipment.

Transformers with ventilating openings should be installed so that the ventilating openings are not blocked. Some transformers are marked to specify a minimum distance to a wall.

The suitability of the transformer circuit grounding, grounding electrode connections, and equipment grounding connections in accordance with Article 250 of the National Electrical Code is to be determined by the local authority having jurisdiction at the time of installation.

In cases where the nature or construction of the transformer is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable special instructions are marked on the transformer.

The basic standard used to investigate products in this category is UL1561, "Dry-Type General Purpose and Power Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products

includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Power Transformer", "Air-Cooled Power Transformer", "Dry Type General Purpose and Power Transformer", or other appropriate product name. The word "Transformer" may be abbreviated "XFMR", "XFRMR", or "XFORMER".

TRANSFORMERS, TOY (XRBV)

This listing covers portable, step-down transformers of the low secondary voltage type suitable for supplying current to electrically operated toys or hobby sets. The marking includes the term "Toy Transformer" or "Hobby Transformer".

The basic standard used to investigate products in this category is UL697, "Toy Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Toy Transformer", "Hobby Transformer".

TRANSIENT VOLTAGE SURGE SUPPRESSORS (XUHT)

GENERAL

This category covers transient voltage surge suppressors intended to limit the maximum amplitude of transient voltage surges on power lines to specified values. They are not intended to function as surge arresters. All transient voltage surge suppressors including those subjected to type C1, C2 and C3 surge-testing waveforms are intended to be installed on the load side of the main service disconnect, in circuits not exceeding 600 V rms.

Listed suppressors have been tested to verify that the average of the transient voltage surges is limited to the suppressed voltage rating (SVR) marked on the product when subjected to a 1.2 by 50 microsecond 6 kV surge.

Cord-connected and direct plug-in transient voltage surge suppressors are not intended for use with medical, dental, or health care facilities equipment.

Listed suppressors that are additionally marked "Classified in Accordance with IEEE C62.41-1991 Recommended Practice" have been adjunct tested to verify that transient voltage surges do not exceed suppressed voltage ratings specified by the manufacturer when subjected to the "Standard Surge-Testing Waveforms" in ANSI/IEEE C62.41-1991, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits" using the test procedures specified in UL 1449 except as follows:

- The duty cycle portion of the testing is conducted at the full peak voltage and current values.
- The suppressed voltage rating (SVR) is equal to or greater than the highest suppressed voltage measured.
- The tests are conducted with minimum 6 in. of leads exiting from the enclosure, in accordance with the manufacturer's instructions, for all "hard wired" permanently connected devices.
- The suppressed voltage rating table, as determined in the Classification evaluation, is marked on or provided with the product.

The following information appears on individual Listing Information Pages available from the manufacturer:

Product Type — Identified as follows:

Product Type	Abbreviation
Permanently Connected	PC
Cord-Connected	CC
Direct Plug-In	DPI

Voltage Rating — Refers to the system operating power frequency voltage and number of phases.

Mode(s) — Refers to the pair of electrical connections where the SVR applies. The term "ALL" indicates that the SVR applies to all combinations of pairs of electrical connections.

SVR — Refers to the suppressed voltage rating of the device evaluated in accordance with UL 1449.

The following information appears on or is provided with products that have been additionally Classified in accordance with IEEE C62.41-1991 as indicated on the individual Listing/Classification Information Pages:

Surge Testing Waveforms — For products which are "Classified in Accordance with IEEE C62.41-1991 Recommended Practice" the waveforms that are applied in testing, indicated in the table below, are in terms of "Location Categories" described in IEEE C62.41-1991.

The peak values of voltage and current for the standard surge-testing waveforms are as follows:

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Standard Waveform Peak Values

Location Category	Ring Wave	Combination Wave
A1	2 kV/0.07 kA	N/A
A2	4 kV/0.13 kA	N/A
A3	6 kV/0.20 kA	N/A
B1	2 kV/0.17 kA	2 kV/1 kA
B2	4 kV/0.33 kA	4 kV/2 kA
B3	6 kV/0.50 kA	6 kV/3 kA
C1	N/A	6 kV/3 kA
C2	N/A	10 kV/5 kA
C3	N/A	20 kV/10 kA

The standard surge-testing waveforms are as follows:

"Standard 1.2/50 us - 8/20 us Combination Wave"**"Standard 0.5 us - 100 kHz Ring Wave"**

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

SVR — Under the "Adjunct Classification" heading, SVR refers to the Suppressed Voltage Rating for the associated surge-testing waveform.

Endurance — Where the number of surges is indicated, an energized sample was subjected to the specified number of surges of the specified waveform, with a minimum of 30 seconds between surges. The suppressed voltage measured following the final surge is required not to deviate from the "as-received" value by more than 10%. Endurance testing is performed in increments of 1000 applications. (e.g., 1000, 2000, 3000, 4000)

UNEVALUATED FACTORS

The effect of the suppressor on connected loads, the effect of the suppressor on harmonic distortion of the supply voltage and the adequacy of the suppression level to protect connected equipment from damage due to transient voltage surges has not been evaluated.

RELATED PRODUCTS

Antenna discharge units intended solely for protection against voltage surges on antennas for radio and television receiving appliances are covered under Television Equipment (WZVQ).

Surge arresters intended to afford protection against surge related damage to secondary distribution wiring systems and/or to equipment connected thereto and installed in accordance with Article 280 of NFPA 70, "National Electrical Code," are covered under Surge Arresters, Lightning Protection (OWHX).

For cord-connected transient voltage surge suppressors employing cord sets provided with leakage current detection and interruption, see Cord Sets with Leakage Current Detection and Interruption (ELGN).

For cord-connected transient voltage surge suppression employing ground-fault circuit interrupters, see Ground-fault Circuit Interrupters (KCXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1449, "Transient Voltage Surge Suppressors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Transient Voltage Surge Suppressor" or "TVSS."

For products that are also Classified in accordance with IEEE C62.41-1991, the Classification Mark consists of the Listing Mark elements described above and the statement: "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C62.41-1991 RECOMMENDED PRACTICE."

TRANSIENT VOLTAGE SURGE SUPPRESSOR/PANELBOARD EXTENSION MODULES, CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (XUPD)

This category includes transient voltage surge suppressors contained within panelboard extension enclosures. They have been investigated and found suitable for use with specific Listed panelboards in accordance with the details described on the Transient Voltage Surge Suppressor/Panelboard Extension Modules or as provided in the publication provided therewith.

For additional information on markings, see the Guide Information for Transient Voltage Surge Suppressors (XUHT) and Panelboards (QEUY).

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The basic standards used to investigate products in this category are UL1449, "Standard For Transient Voltage Surge Suppressors", and UL67, "Standard for Panelboards".

A Transient Voltage Surge Suppressor/Panelboard Extension Modules that is Classified is marked where visible after installation with the statement:

"Classified for use only in specified panelboards. For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. _____ provided with this Transient Voltage Surge Suppressor/Panelboard Extension Modules. If additional information is necessary, contact _____ (Classified Transient Voltage Surge Suppressor/Panelboard Extension Modules manufacturer's name)".

The referenced publication is a compatibility list which tabulates the company name, catalog number, number of poles and electrical ratings of the Classified Transient Voltage Surge Suppressor/Panelboard Extension Modules, in addition to the company name and catalog number of the applicable UL Listed panelboards in which the Classified Transient Voltage Surge Suppressor/Panelboard Extension Modules have been investigated. The compatibility list also details the maximum permissible voltage and maximum available short circuit current of the supply system to the panelboard. The Classified Transient Voltage Surge Suppressor/Panelboard Extension Modules is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each Transient Voltage Surge Suppressor/Panelboard Extension Modules.

Transient Voltage Surge Suppressor/Panelboard Extension Modules which are additionally marked "Classified in Accordance with IEEE C62.41-1991 Recommended Practice" have been adjunct tested to verify that transient voltage surges do not exceed suppressed voltage ratings specified by the manufacturer when subjected to the "Standard Surge-Testing Waveforms" in ANSI/IEEE C62.41-1991, IEEE Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits using the test procedures specified in UL1449 except as follows:

- The duty cycle portion of the testing is conducted at the full peak voltage and current values.
- The suppressed voltage rating (SVR) is equal to or greater than the highest suppressed voltage measured.
- The tests are conducted with minimum 6 inches of leads exiting from the enclosure, in accordance with the manufacturer's instructions, for all "hard wired" permanently connected devices.
- The suppressed voltage rating table, as determined in the Classification evaluation, is marked on or provided with the product.

The following information appears on individual Classification Information Pages available from the manufacturer:

Product Type-Identified as follows:

Product Type	Abbreviation
Permanently Connected	PC
Cord-Connected	CC
Direct Plug-In	DPI

Voltage Rating - refers to the system operating power frequency voltage and number of phases.

Mode(s) - refers to the pair of electrical connections where the SVR applies.

The term "ALL" indicates that the SVR applies to all combinations of pairs of electrical connections.

SVR - refers to the suppressed voltage rating of the device evaluated in accordance with UL1449.

The following information appears on or is provided with products which have been additionally Classified in Accordance with IEEE C62.41-1991 Recommended Practice, as indicated on the individual Listing/Classification Information Pages:

Surge Testing Waveforms - For products which are "Classified in Accordance with IEEE C62.41-1991 Recommended Practice" the waveforms that are applied in testing, indicated in the table below, are in terms of "Location Categories" described in IEEE C62.41-1991.

The peak values of voltage and current for the standard surge-testing waveforms are as follows:

Standard Waveform Peak Values

Location Category	Ring Wave	Combination Wave
A1	2kV/0.07kA	N/A
A2	4kV/0.13kA	N/A
A3	6kV/0.20kA	N/A
B1	2kV/0.17kA	2kV/1kA
B2	4kV/0.33kA	4kV/2kA
B3	6kV/0.50kA	6kV/3kA
C1	N/A	6kV/3kA
C2	N/A	10kV/5kA

Location Category
C3Ring Wave
N/ACombination Wave
20kV/10kA

The standard surge-testing waveforms are as follows:

"Standard 1.2/50 us - 8/20 us Combination Wave"

"Standard 0.5 us - 100 kHz Ring Wave"

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

SVR-Under the "Adjunct Classification" heading, SVR refers to the Suppressed Voltage Rating for the associated surge-testing waveform.

Endurance-Where the number of surges is indicated, an energized sample was subjected to the specified number of surges of the specified waveform, with a minimum of 30 seconds between surges. The suppressed voltage measured following the final surge is required not to deviate from the "as-received" value by more than 10%. Endurance testing is performed in increments of 1000 applications. (e.g. 1000, 2000, 3000, 4000, etc.)

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. as appropriate (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol and the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory) on the front, visible surface of the Transient Voltage Surge Suppressor/Panelboard Extension Modules.

In addition, the Classification Marking text for these products includes "Transient Voltage Surge Suppressor/Panelboard Extension Modules", together with a control number, on the side of the Transient Voltage Surge Suppressor/Panelboard Extension Modules.

For products that are also Classified in Accordance with IEEE C62.41-1991, Recommended Practices, the Marking consists of the Classification Mark described above and the following statement:

"ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C62.41-1991 RECOMMENDED PRACTICE."

TRANSIT APPLICATION EQUIPMENT AND SYSTEMS (XUPY)

This category covers switches, controllers and other equipment that is intended to be applied in transit systems.

SWITCHES, ISOLATING (XUTE)

This category covers single pole switches that are intended to isolate sections of track as needed for maintenance or similar functions.

These switches may be open types or enclosed and may be either manually or motor-operated.

Open type switches are intended for installation in electrical enclosures in accordance with product markings and any accompanying instructions.

These switches are rated 6000A and 1000 VDC maximum.

The basic standard used to evaluate switches in this category is UL-98, Enclosed and Deadfront Switches, with the requirements adjusted for ratings not covered in the standard.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Transit System Isolating Switch" or "Transit System Sectionalizing Switch".

TUBING, FLEXIBLE NONMETALLIC (YCTR)

These listings include woven flexible nonmetallic tubing (fiber loom) in trade sizes 7/32 to 2-1/2 in. incl. for installation as mechanical protection in accordance with Articles 320 and 324 of the National Electrical Code.

The basic standard used to investigate products in this category is UL3, "Flexible Nonmetallic Tubing".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Flexible Tubing".

UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE (YDUX)

GENERAL

This category covers underground feeder and branch circuit cable, rated 600 V, in sizes 14 to 4/0 AWG inclusive, copper, and 12 to 4/0 AWG inclusive, aluminum or copper-clad aluminum, for single and multiple conductor cables. It is designated as Type UF cable and is intended for use in accordance with Article 340 of NFPA 70, "National Electrical Code" (NEC).

Some multiconductor cable is surface marked with the suffix "B" immediately following the type letters to indicate the usage of conductors employing 90°C rated insulation.

Such cable may also be installed as Nonmetallic-sheathed Cable, per Section 340.10(4) of the NEC. The ampacities of Type UF cable, with or without the suffix "B," are those of 60°C rated conductors as specified in the latest edition of the NEC.

Submersible Water Pump Cable — Indicates multiconductor cable in which 2, 3 or 4 single-conductor Type UF cables are provided in a flat or twisted assembly. The cable is Listed in sizes from 14 AWG to 4/0 AWG inclusive, copper, and from 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The insulation may also be surface marked "Pump Cable." The cable may be directly buried in the earth in conjunction with this use.

This cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

This cable may be terminated at boxes and other enclosures by using nonmetallic-sheathed cable connectors [see Nonmetallic-sheathed Cable Connectors (PXJV)].

Cable suitable for exposure to direct rays of the sun is indicated by tag marking and marking on the surface of the cable with the designation "Sunlight Resistant."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 493, "Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Underground feeder cable that contains copper or copper-clad aluminum conductor has the product name "Underground Feeder Cable"; underground feeder cable that contains aluminum conductor has the product name "Aluminum Underground Feeder Cable."

UNINTERRUPTIBLE POWER SUPPLY EQUIPMENT (YEDU)

This category covers indoor and outdoor use uninterruptible power supply (UPS) equipment which may be stationary or fixed. This equipment is rated 600 v or less and is intended for use in ordinary locations in accordance with the National Electrical Code.

This category also covers Listed Uninterruptible Power Supply Equipment which are rebuilt by the original manufacturer or other parties having the necessary facilities, technical knowledge and skills. Uninterruptible Power Supply Equipment is rebuilt by using new or reconditioned parts and are subjected to the same requirements as new products.

An uninterruptible power supply (UPS) covered in this category is used to provide alternating current power to a load for some period of time in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

These products include the following equipment intended for use with UPS: (1) battery supply modules with or without batteries, (2) remote status panels, (3) bypass switches, (4) maintenance bypass switches, (5) battery circuit disconnect switches, (6) rectifier and power conversion units, and (7) power distribution panels.

The investigation of UPS equipment does not include the effects on the load that may be caused by momentary disruption of alternating current power.

A UPS identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in the general guide information under Equipment For Use in Ordinary Locations (AALZ).

This category does not include a UPS intended as a component of a fire-protective signaling system or burglary protective signaling system. Such products are listed in the respective Fire Protection Equipment and Security Equipment Directories.

UPS systems for use with professional medical and dental equipment are covered in the Electrical Appliance and Utilization Equipment Directory under the category "Uninterruptible Power Supplies for Use in Health Care Facilities", (KFFG).

Battery-powered, emergency equipment for controlling lighting and/or power in accordance with NEC Article 700 are covered under the category of Emergency Lighting and Power Equipment (FTBR).

Products covered by this category that are suitable for use in computer rooms in accordance with the Standard for Protection of Electronic Computer/Data Processing Equipment, ANSI/NFPA 75 are marked "Suitable for Computer room Applications" or the equivalent.

Products covered by this category include large UPS equipment requiring field assembly of modules or subassemblies which are appropriately marked as indicated below.

The basic standard used to investigate products in this category is UL 1778, "Uninterruptible Power Supply Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed", a control number, and one of the following product names "Uninterruptible Power Supply", "UPS Battery Supply", "UPS Status Panel", "UPS Transfer Switch", "UPS Inverter", "UPS Rectifier/Charger", "UPS Equipment Enclosure", "UPS Equipment Part", "UPS Equipment Subassembly", "UPS Equipment Accessory", "UPS Power Distribution Panel", or other appropriate product name.

For rebuilt products, the word "Rebuilt", "Remanufactured" or "Reconditioned" additionally precedes the product name.

MAINTENANCE SERVICE FOR UNINTERRUPTIBLE POWER SUPPLY SYSTEMS (YEET)

This category covers service companies Certificated as maintenance service providers for uninterruptible power supply (UPS) equipment in the field.

Service companies that are covered in the directory have demonstrated their capability for maintaining field installed UPS equipment in accordance with the requirements established by their internal maintenance documentation.

Each UPS system covered by a Certificate is required to be maintained by the service company responsible for issuing the Certificate. A UPS system is considered to be included in this program only if it is covered by a current Certificate.

The Certificate serves as evidence that the service company (1) is covered as a Maintenance Service Company for UPS Equipment; (2) is authorized to issue the Certificate for the serviced equipment as representation that the equipment is in compliance with requirements established by their internal documentation that has been reviewed by UL; and (3) is subject to UL's field countercheck program whereby periodic inspections are made of representative serviced equipment in the field and at the maintenance service company to verify correctness of the certificated practices.

The maintenance service Certificate indicates identification and location (address) of the serviced equipment, and the service center from which it was issued. Each Certificate also bears a unique serial number and the period of time covered by the Certificate.

Periodic quality audits at the central maintenance service company's location are conducted by UL to verify that the necessary documentation and records are in place for each service location. The Certificate of Underwriters Laboratories Inc. is the only method provided by UL to identify field installed equipment under its Certificated Maintenance and Follow-Up Service.

Appearance of a company's name in the Directory does not mean that all UPS systems serviced by that company are covered under the Certifi-

cated Maintenance Service. Only the systems for which a Certificate has been properly issued are covered under UL's Certificated Maintenance Service.

Underwriters Laboratories Inc. makes no representations or warranties, expressed or implied, that the UPS system will prevent any loss, or that the system will in all cases provide the protection for which it is installed or intended. The Certificate only evidences that UL conducts countercheck field inspections of representative serviced equipment. UL does not assume or undertake to discharge any liability of the maintenance service company or any other party. UL is not an insurer and assumes no liability for any loss which may result from failure of the equipment, incorrect certification, non-conformity with requirements, cancellation of the Certificate, or withdrawal of the company from UL's Directory prior to the expiration appearing on the Certificate. If servicing is found not in conformity with requirements, it shall be corrected or the Certificate is subject to cancellation.

LOOK FOR THE CERTIFICATE

UNIT SUBSTATIONS (YEFR)

GENERAL

This category covers unit substations rated 600 V or less intended to be installed in accordance with the requirements of the National Electrical Code and in accordance with the installation instructions provided on the unit substation.

A unit substation consists of a transformer in combination with primary and/or secondary overcurrent protective devices or switching devices housed in a single enclosure.

Where in normal operation the load will continue for 3 hours or more, molded case circuit breakers and fuses should not be loaded to exceed 80 percent of their current rating.

Some unit substations are suitable for use as service equipment and are so marked. Such marking is part of the listing mark as noted below, or is an integral part of other required markings.

Listed unit substations are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors, the marking will indicate "Use copper or aluminum wire." A unit substation employing terminals for main or branch circuit units individually marked "Cu-A1" will be marked "Use copper-A1 wire" or "Use copper wire only." The latter statement indicates that wiring space or other factors make the unit substation unsuitable for aluminum conductors.

Unless the unit substation is marked with both the size and temperature rating of wire to be used, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG and 75°C ampacities for wire 1/0 AWG and larger.

Unit substations have the secondary neutral bonded to the enclosure and have provision on the neutral for connection of a grounding conductor. A terminal is also provided on the enclosure near the line terminals for use with an equipment grounding conductor between the unit substation and the enclosure of equipment on the line side of the unit substation for use when a metallic conduit system is not provided.

The suitability of unit substations for use on high capacity circuits has not been investigated.

Unit substations are marked with enclosure type number 1, 2 or 3R described in Electrical Equipment for Use in Ordinary Locations (AALZ).

A unit substation marked "Type 3R" may also be marked "Rainproof."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1062, "Unit Substations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Unit Substation."

UNIT SUBSTATIONS OVER 600 V (YEFV)

USE AND INSTALLATION

This category covers three-phase articulated and integral unit substations for step-down operation. Articulated substations are rated through 10,000 kVA, at primary voltages of 601 V through 38 kV (nominal 35 kV). Integral substations are rated through 2500 kVA at primary voltages of 601 V through 38 kV.

Articulated unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as multiple self-enclosed pieces of equipment intended for connection in the field.

Integral unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as a single self-enclosed piece of equipment. Sections may be shipped separately.

An articulated unit substation may consist of several separately Listed pieces of equipment. Only those sections provided with unit substation Listing Marks have been investigated as part of an articulated unit substation. The suitability of other assemblies will need to be determined by the Authority Having Jurisdiction.

The transformer section(s) house the three-phase power transformer(s) for step-down operation. These unit substation transformers are ventilated dry-type or cast resin type.

The input sections may consist of a terminal chamber, metal-clad switchgear, or metal-enclosed interrupter switchgear.

The output sections may consist of metal-clad switchgear, metal-enclosed interrupter switchgear, a motor control center, molded-case circuit breaker equipment, fused switch equipment, a dead-front switchboard, a panel-board or similar types of distribution or control equipment.

A transition section may be located between a transformer section and an input section, between a transformer section and an output section, between different types of input sections, or between different types of output sections. Transition sections may be integral parts of two adjacent sections, an integral part of one of the sections, or a separate section.

The transformer ratings determine the kVA and voltage capabilities of the overall integral unit substation.

These unit substations are intended for installation in accordance with the requirements of NFPA 70, "National Electrical Code" and in accordance with the installation instructions provided on the equipment.

PRODUCT MARKINGS

A master nameplate is mounted on an external surface of the enclosure and visible after normal installation of the equipment. This master nameplate includes the following information as a minimum: manufacturer's name and equipment identification number, kVA rating or ratings if force cooled, primary and secondary lightning impulse withstand voltage (BIL) ratings, primary and secondary voltage ratings, primary and secondary continuous current ratings, transformer design impedance, and total weight. If metal-clad switchgear or metal-enclosed interrupter switchgear is connected to the transformer primary, the nameplate also includes a short-time current carrying rating and momentary current rating.

Each section of the unit substation also has its own rating based on the requirements in standards applicable for that section of the equipment. These individual section ratings are coordinated to be equal to or greater than the rating of the unit substation.

The enclosure of the integral unit substation or the several enclosures of an articulated unit substation are marked to indicate the exposure category (A, B or C) for which it is intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; and enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only.

An enclosure which has been investigated to determine it is rainproof is marked "Rainproof," "Outdoor" or "3R." The enclosure may be either nonventilated or ventilated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate articulated unit substations is ANSI/IEEE C37.121-1989, "Unit Substation - Requirements"

The basic standard used to investigate integral unit substations is ANSI C37.120-19XX (17th draft - 7/12/79), "Proposed American National Standard for Integral Three-Phase Unit Substations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Unit Substation Section" and "____ of ____," where the first space is stamped with a number indicating the position (reading from left to right) that the section occupies in the series of sections constituting the unit substation, and the second space indicates the total number of sections which are provided as part of the unit substation.

VALVES, TRANSFORMER RELIEF (YUIK)

These valves are intended for installation on oil-filled transformers to relieve pressures or vacuums created by the heating or cooling of the transformer oil under normal operation only. They are not intended to relieve pressures developed by electrical disturbances or breakdown in the transformer operation.

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and the following product name: "Transformer Relief Valve".

WIND TURBINE GENERATING SYSTEMS (ZGXX)

This category covers wind turbine generating systems (WTGS) that produce AC or DC electric power from a wind driven generator.

WTGS consist of one or more turbines (blades, hub, generator, drive train, support structure), control, power collection, power distribution and protection systems. Each subsystem of the overall assembly is marked with the assembly identifier. WTGS are designed for use in specific environmental conditions, including normal and extreme wind speeds, ambient temperature, humidity, rain, lightning and salinity, as defined in the manufacturer's design documentation, and are intended for installation, assembly and erection in accordance with the manufacturer's instructions and subject to approval by the Authority Having Jurisdiction, with respect to requirements in the National Electrical Code, Model Building Code, Mechanical Code or an applicable Building Code of the local jurisdiction.

SMALL WIND TURBINE GENERATING SYSTEMS (ZGYW)

INSTALLATION AND USE

This category covers small wind turbine generating systems (SWTGS) that have swept areas of less than 40 m² and generate at a voltage below 1000 V ac or 1500 V dc. The system classes are "Normal" and "Special" based on their anticipated site parameters. "Normal" class turbines have been evaluated for the following parameters:

Extreme Wind Speed — 35 m/s (78.3mph)
Normal Operating Temperature — -10°C to 40°C
Extreme Operating Temperature — -20°C to 50°C
Maximum Relative Humidity — 95%
Sea Level Air Density of — 1.225 kg/m³

External conditions for "Special" class turbines are defined by the manufacturer.

REQUIREMENTS

The basic standard used to investigate products in this category is IEC 61400-2, "Wind Turbine Generating Systems - Part 2: Safety of Small Wind Turbines."

For additional information, see Wind Turbine Generating Systems (ZGXX).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "IN ACCORDANCE WITH IEC STANDARD 61400-2, Issued (date of publication)." a control number and the product identity: "Small Wind Turbine Generating System."

LARGE WIND TURBINE GENERATING SYSTEMS (ZGYZ)

INSTALLATION AND USE

This category covers large wind turbine generating systems (LWTGS) that have swept areas of 40 m² or larger. The system classes, which are based on their anticipated site parameters are as follows:

LWTGS Class	Annual Average Wind Speed	Characteristic Turbulence Intensity
IA	10 m/s (22.4 mph)	0.18

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ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

LWTGS Class	Annual Average Wind Speed	Characteristic Turbulence Intensity
IB	10 m/s (22.4 mph)	0.16
IIA	8.5 m/s (19.0 mph)	0.18
IIB	8.5 m/s (19.0 mph)	0.16
IIIA	7.5 m/s (16.8 mph)	0.18
IIIB	7.5 m/s (16.8 mph)	0.16
IVA	6 m/s (13.4 mph)	0.18
IVB	6 m/s (13.4 mph)	0.16
S	Values as specified by the turbine manufacturer	

REQUIREMENTS

The basic standard used to evaluate large wind turbine generating systems is IEC 61400-1, Wind Turbine Generating Systems - Part 1: Safety Requirements. For additional information, see Wind Turbine Generating Systems (ZGXW).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Large Wind Turbine Generating System," "IN ACCORDANCE WITH IEC STANDARD 61400-1, Issued (date of publication)," and a control number.

WIND TURBINE GENERATING SYSTEMS SUBASSEMBLIES (ZGZJ)

USE

This category covers subassemblies such as blades, towers, generators, gear boxes, control panels, yaw drives, and utility grid interconnect equipment which are intended for field installation for use only with specific wind turbine generating systems.

PRODUCT MARKING

Correct combination of wind turbine generating systems and subassemblies are indicated by markings on or with the subassembly and/or the wind turbine generating system.

REQUIREMENTS

The basic standards used to evaluate wind turbine generating system subassemblies are IEC 61400-1, Wind Turbine Generating Systems - Part 1: Safety Requirements and IEC 61400-2, Wind Turbine Generating Systems - Part 2: Safety of Small Wind Turbines.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "IN ACCORDANCE WITH IEC STANDARD 61400-1, Issued (date of publication)," a control number and one of the following product names: "Wind Turbine Generator," "Wind Turbine Blade" or appropriate product name as shown in the individual Classification.

WIRE (ZGZX)

This category covers insulated wire intended for installation and use in accordance with NFPA 70, "National Electrical Code." Construction details are contained in the individual General Information sections under the various wire categories.

FIXTURE WIRE (ZIPR)

GENERAL

This category covers fixture wire for use in accordance with Article 402 of NFPA 70, "National Electrical Code."

All conductors are copper except fixture wire having a temperature rating higher than 90°C may employ nickel.

Thermoplastic compounds tend to stiffen at temperatures below -10°C (14°F) and care should be taken in handling at such temperatures.

Gasoline resistant wire has been tested at 23°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating of the wire type.

Gasoline Resistant TFN or TFFN — Indicates a TFN and TFFN conductor with a jacket of extruded nylon suitable for exposure to mineral oil, and to liquid gasoline and gasoline vapors at ordinary ambient temperature. It is identified by tag marking and by printing on the insulation or nylon jacket with the designation "Type TFN (TFFN) Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60°C, or "Type TFN (TFFN) Gasoline and Oil Resistant II" if suitable for exposure to mineral oil at 75°C.

2003 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY 133

Wire that complies with a special Vertical Flame Test is marked "VW-1." Fixture wire is designated as follows:

60°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TF, TFF
75°C maximum operating temperature	Thermoset-insulated, heat resistant wire: 600 V, 18-16 AWG: Types RFH-2, FFH-2
90°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TFN, TFFN
150°C maximum operating temperature	Silicone-rubber-insulated wire: 300 V, 18 AWG: Type SFF-1 600 V, 18-14 AWG: Type SFF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PFF, PGFF
200°C maximum operating temperature	Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTFE Cross-linked polyolefin-insulated wire: 300 V, 18-10 AWG: Types XF, XFF Silicone-rubber-insulated wire: 300 V, 18 AWG: Type SF-1 600 V, 18-14 AWG: Type SF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PF, PGF
250°C maximum operating temperature	Aromatic polyimide tape insulated wire: 300 V, 18-10 AWG: Types KF-1, KFF-1 600 V, 18-10 AWG: Types KF-2, KFF-2 Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTF

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 66, "Fixture Wire."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fixture Wire."

FLEXIBLE CORD (ZJCZ)

GENERAL

This category covers flexible cord constructed and Listed for use in accordance with Article 400 of NFPA 70, "National Electrical Code" (NEC). All conductors are stranded copper.

Voltage Ratings

"Clock Cord" is rated 125 V.

Types C (14-10 AWG), PD (14-10 AWG), S, SO, SOO, SOW, SOOW, ST, STO, STOO, STW, STOW, STOOW, SE, SEO, SEOO, SEW, SEOW and SEOOW are rated 600 V.

Types C (18-16 AWG), PD (18-16 AWG) and all other types are rated 300 V.

Conductor Sizes

The conductor size ranges are as specified in the NEC with the following exceptions:

Types XTW, 20-18 AWG; CXTW, 22-18 AWG; "Clock Cord," 20 AWG; and "Shaver Cord," 27 and 20 AWG.

Temperature Ratings

Types C, PD, SP-1, SP-2, SP-3, NISP-1, NISP-2, SRD, E, EN, ETP, ETT, TPT, TS, TST and "Shaver Cord" are rated 60°C.

Type SRDT is rated 60 or 90°C.

Types XTW and CXTW are rated 105°C.

Types SPE-1, SPE-2, SPE-3, SVE, SVEO, SVEOO, SJE, SJO, SJOOW, SJEOW, SJEOW, SJEOW, SE, SEO, SEOO, SEW, SEOW, SEOW, HPD, HPN, HSJ, HSJO, HSJOO, HS, HSO and HSOO are rated 90 or 105°C.

"Clock Cord" is rated 60 or 105°C.

All other cord types are rated 60, 75, 90 or 105°C. Cord having a temperature rating higher than 60°C has the rating printed on the outer surface of the cord. If the cord is rated 60°C, no temperature rating appears.

Cord Types or Characteristics Not Covered by the NEC

Types NISP-1, NISP-2, NISPT-1, NISPT-2, NISPE-1 and NISPE-2 are parallel constructions, similar to SPT-1, etc., except that the conductors are individually insulated, laid parallel, with a non-integral, overall jacket.

Type XTW is a parallel assembly of two conductors intended for use in decorative lighting equipment.

Type CXTW is a single conductor or twisted assembly of two conductors intended for use in decorative lighting equipment.

"Clock Cord," which has no Type designation, is similar to Type XTW except for conductor size.

"Shaver Cord," which has no Type designation, is similar to Type TPT except for the conductor configuration.

PRODUCT MARKINGS

"Water Resistant" indicates that the cord is suitable for immersion in water.

"For Mobile Home Use," "For Recreational Vehicle Use" or "For Mobile Home and Recreational Vehicle Use," followed by current rating in amps, indicates suitability for use in mobile homes or recreational vehicles.

"Outdoor" or "W-A" indicates suitability for use outdoors. The low temperature rating for this cord is -40°C unless otherwise marked on the cord.

"W" indicates suitability for use outdoors and for immersion in water. The low temperature rating for this cord is -40°C unless otherwise marked on the cord with optional ratings of -50, -60, or -70°C. The low temperature ratings are determined by means of a bend test (not a suppleness test) at the given temperature.

"VW-1" indicates that the cord complies with a Vertical Flame Test. Cord that has been evaluated for leakage currents between the circuit conductor and the grounding conductor, and between the circuit conductor and the outer surface of the jacket, may have the values so marked on the cable jacket.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 62, "Flexible Cord and Fixture Wire."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Cord."

GAS TUBE SIGN AND IGNITION CABLE (ZJQX)

GENERAL

This category covers gas tube sign and ignition cable Listed as single conductor Type GTO-5 (5000 V), GTO-10 (10,000 V) or GTO-15 (15,000 V), in sizes 18-10 AWG copper, and 12-10 AWG aluminum and copper-clad aluminum. This material is intended for use with gas tube signs, oil burners and inside lighting.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKINGS

The suffix "L" used in combination with any of the preceding type letter designations indicates that an outer covering of lead has been applied.

Wire with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Wire with aluminum conductors is surface printed "AL."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 814, "Gas-Tube-Sign and Ignition Cable."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Gas tube sign and ignition cable that contains a copper or copper-clad aluminum conductor has the product name "Gas Tube Sign and Ignition Cable"; gas tube sign and ignition cable that contains an aluminum conductor has the product name "Gas Tube Sign and Ignition Aluminum Cable."

MACHINE-TOOL WIRE (ZKHZ)

GENERAL

This category covers machine-tool wire and cable which is all-thermoplastic Type MTW 600 V wire and cable for use as specified in NFPA 70, "National Electrical Code" and in NFPA 79, "Electrical Standard for Industrial Machinery." The finished wire or cable is flame retardant and suitable for use at 90°C (194°F) and lower temperatures in dry locations, and at 60°C (140°F) and lower temperatures where exposed to moisture, oil or coolants, that is, to cutting oils and the like.

The single-conductor constructions are:

Construction A — All PVC-insulated

Construction B — PVC-insulated with a nylon jacket

Both constructions are labeled in sizes 22 AWG to 1000 kcmil inclusive, stranded copper.

The multiple-conductor constructions consist of assemblies of these single-conductor constructions enclosed by a PVC jacket.

Single- and multiple-conductor wire and cable employing 16-10 AWG conductors having the stranding for flexing service are surface marked "flexing" or "Class K." This marking is optional for smaller conductors intended for flexing service.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1063, "Machine-Tool Wires and Cables."

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Machine Tool Wire."

PROCESSED WIRE (ZKLU)

GENERAL

This category covers Listed wire, flexible cord and cable, and Classified cable that has been subjected to processing subsequent to Labeling and identified as either processed wire or processed wire-respooled.

Products identified as "Listed Processed Wire" are Listed wire, flexible cord and cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. The stripped ends may be soldered or tinned and may have simple terminals of the eyelet, ring, open spade or quick-connect type attached by crimping, soldering or welding.

These lengths may be packaged for further processing. Single lengths of Listed processed wire and cable may be paralleled with other insulated wires and cables and may be held together by an open binder.

Products identified as "Listed Processed Wire-Respooled" are single, continuous lengths of Listed wire, flexible cord or cable cut from a longer length and coiled or placed on a spool or reel.

Products identified as "Classified Processed Wire" are Classified cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. These lengths may be packaged for further processing. Single lengths of Classified processed wire may be paralleled with other insulated cable and may be held together by an open binder.

Products identified as "Classified Processed Wire-Respooled" are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel.

The tag markings from the wire spooler reel (e.g., voltage, temperature, insulation thickness, usage) are provided on the processed wire tag attached to the product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing or Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing or Classification and Follow-Up Service. The Listing or Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED" or "CLASSIFIED" respectively, a control number, and the product name "Processed Wire" or "Processed Wire-Respooled."

THERMOSET-INSULATED WIRE (ZKST)

GENERAL

This category covers thermoset-insulated wire and cable (tabulated below) which is flame retardant and rated 600 V, except for Types RHH, RHW and RHW-2 which may be rated 2000 V. The voltage rating is marked on the outer surface of the wire or cable.

PRODUCT MARKINGS

RHW — Indicates a single conductor having a thermoset insulation, with or without a nonmetallic covering, rated 75°C dry, 75°C wet.

RHW-2 — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry, 90°C wet.

RHH — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry only.

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XHH — Indicates a single conductor having a cross-linked synthetic polymer insulation with no overall covering provided, rated 90°C dry.

XHHW — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 75°C wet.

XHHW-2 — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 90°C wet.

SA — Indicates a single conductor having thermosetting silicone rubber insulation and a nonmetallic covering rated 90°C dry, general use, 200°C dry, special applications.

SIS — Indicates a single conductor having thermosetting insulation with no overall covering provided rated 90°C dry, for switchboard wiring only.

D — Used as a suffix indicating a twin wire having two insulated conductors laid parallel under an outer nonmetallic covering.

M — Used as a suffix indicating a cable having two or more insulated single conductors twisted together under an outer nonmetallic covering.

This wire, in sizes mentioned below, may employ copper, aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "Cu-Clad Al" or "AL (CU-CLAD)." Wire with aluminum conductors is surface printed "AL."

In addition to the required AWG or kcmil size, the metric equivalent may be marked on the wire, e.g. "6 AWG (13.3 MM2)" or "13.3 MM2 (6 AWG)."

Types RHH, RHW, RHW-2, XHH, XHHW, XHHW-2 and SA are Listed in sizes 14 AWG through 2000 kcmil copper, and 12 AWG through 2000 kcmil aluminum or copper-clad aluminum. Type SIS is Listed in sizes 14 through 4/0 AWG copper, and 12 through 4/0 AWG aluminum or copper-clad aluminum.

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Wire bearing multiple type designations is suitable for the temperature associated with each use. For example, a wire marked "RHH or RHW" is suitable for 90°C in dry locations, and 75°C in wet locations.

Wire marked "gasoline resistant" has been tested at 23°C when immersed in gasoline. Wire marked "Oil Resistant I" and "Oil Resistant II" has been tested for immersion in mineral oil at 60°C and 75°C, respectively.

Wire and cable marked "Cable Tray Use" complies with a Vertical-Tray Flame Test. Wire and cable marked "Sunlight Resistant" complies with an artificial weathering test. The "Cable Tray Use" marking, with or without the "Sunlight Resistant" marking, pertains to single conductor sizes 4 through 1 AWG for grounding conductors only, single conductor sizes 1/0 AWG and larger, and all sizes of multiconductor Types RHH, RHW, RHW-2, XHH, XHHW and XHHW-2. Wire Types RHW, RHW-2, XHHW and XHHW-2 intended to be installed on a messenger may be marked "Sunlight Resistant" in all sizes.

Wire marked "VW-1" complies with a Vertical Flame Test; all others comply with a Horizontal Flame Test.

Wire that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "LS."

Wire and cable marked "-40 C" complies with a cold impact test conducted at that temperature. This does not necessarily mean that the cable can be easily installed at that temperature. Different installation conditions and configurations require that care be taken when installing cable at low temperatures.

Submersible Water Pump Cable — Indicates multiconductor cable in which two, three or four Type RHW, RHW-2, XHHW or XHHW-2 conductors are provided in a flat or twisted assembly. The cable is Listed in sizes from 14 AWG through 500 kcmil copper, and from 12 AWG through 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The surface of the wire may also be marked "Pump Cable." The cable has not been evaluated for direct burial in the earth unless the single conductors carry an additional "Type USE" or "Type USE-2" marking.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 44, "Thermoset-insulated Wires and Cables."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method pro-

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vided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoset-insulated wire that contains copper or copper-clad aluminum conductors has the product name "Insulated Wire"; thermoset-insulated wire that contains aluminum conductors has the product name "Insulated Aluminum Wire."

THERMOPLASTIC-INSULATED WIRE (ZLGR)

GENERAL

This category covers thermoplastic-insulated wire for use in accordance with Article 310 of NFPA 70, "National Electrical Code."

Thermoplastic-insulated wire is rated 600 V and is designated as follows:

TW — Indicates a single conductor having flame-retardant, moisture-resistant thermoplastic insulation. The wire is rated 60°C wet or dry.

THHN — Indicates a single conductor having flame-retardant and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 90°C dry only.

THW — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 75°C wet or dry.

THHW — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 90°C dry and 75°C wet.

THWN — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 75°C wet or dry. THWN wire suitable for exposure to mineral oil and to liquid gasoline and gasoline vapors at ordinary ambient temperature is marked "Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60°C, or "Gasoline and Oil Resistant II" if the compound is suitable for exposure to mineral oil at 75°C. Gasoline resistant wire has been tested at 23°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating.

FEP — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation. Type FEP wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

FEPB — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation with a glass braid. Type FEPB wire is suitable for general use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

PFA — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. Type PFA wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower for special applications.

PFAH — Indicates a single, nickel or nickel-coated copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. The PFAH is suitable for use at 250°C and lower temperatures only for leads within apparatus or within raceways connected to apparatus, in dry locations only.

TFE — Indicates a single, nickel-coated copper or nickel base alloy conductor having flame-retardant and heat-resistant thermoplastic (polytetrafluoroethylene) insulation. Type TFE wire is suitable for use at 250°C and lower temperatures in dry locations as leads within apparatus or within raceways connected to apparatus or as open wiring.

Z — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type Z wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

ZW — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type ZW wire is suitable for use in dry locations at 90°C or wet locations at 75°C. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

TBS — Indicates a single conductor switchboard wire having thermoplastic insulation and a flame-retardant nonmetallic covering. Type TBS is suitable for use at 90°C and lower temperatures in dry locations.

PRODUCT MARKINGS

Types THW, THWN and ZW that are rated at 90°C for both wet and dry locations are so designated with the suffix "-2."

Types TW, THW, THW-2, THHN, THHW, THWN, THWN-2, PFA, PFAH and Z in sizes 4 to 1 AWG for grounding conductors only and in sizes 1/0 AWG and larger for circuit and grounding conductors that are marked "Cable Tray Use" comply with a vertical-tray cable flame test. Wire so

marked may additionally be marked "Sunlight Resistant" indicating compliance with an artificial weathering test.

Types TW, THW, THW-2, THHW, THWN and THWN-2 in all sizes that are marked "Sunlight Resistant" comply with an artificial weathering test.

Wire suitable for exposure to mineral oil is marked "Oil Resistant I" for 60°C oil resistance, or "Oil Resistant II" for 75°C oil resistance, on the surface of the wire. An Oil Resistant marking, by itself, does not include resistance to gasoline or similar light petroleum solvents.

Wire that complies with a special vertical flame test is surface marked "VW-1."

Constructions in this category that comply with a flame and smoke test (as described in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables") may have the suffix "LS," indicating "Limited Smoke," added to the Type letters.

Submersible Water Pump Cable — Indicates multiconductor cable consisting of two or three flat or two to six twisted insulated conductors with or without an overall jacket. The cable is labeled in size 14 AWG to 500 kcmil copper, and 12 AWG to 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep-well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The insulation may also be surface marked "Pump Cable." The cable has not been evaluated for direct burial in the earth.

Wire, in sizes mentioned below, may employ copper or aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Wire with aluminum conductors is surface printed "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for product employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Types TW and THW are Listed in sizes 14 AWG to 2000 kcmil copper and 12 AWG to 2000 kcmil aluminum or copper-clad aluminum.

Types THHN, THWN and THHW are Listed in sizes 14 AWG to 1000 kcmil copper and 12 AWG to 1000 kcmil aluminum or copper-clad aluminum.

Types TA, TBS, PFA, PFAH and Z are Listed in sizes 14 to 4/0 AWG copper and 12 to 4/0 AWG aluminum or copper-clad aluminum.

Types ZW, FEP and FEPB are Listed in sizes 14 to 2 AWG copper and 12 to 2 AWG aluminum or copper-clad aluminum.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 83, "Thermoplastic-insulated Wires and Cables."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoplastic-insulated wire that contains copper or copper-clad aluminum conductor has the product name "Insulated Wire"; thermoplastic-insulated wire that contains aluminum conductor has the product name "Insulated Aluminum Wire."

WELDING CABLE (ZMAY)

GENERAL

This category covers welding cable which is a single-conductor cable intended for use in the secondary circuit of electric welders in accordance with Article 630, Part IV of NFPA 70, "National Electrical Code." Welding cable is rated 60, 75 or 90°C and 100 or 600 V. The voltage and temperature ratings, if higher than 100 V and 60°C, respectively, are identified by tag marking and by printing on the surface of the insulation. The conductors are flexible-stranded copper, 8 AWG through 250 kcmil, the individual strands of which are 34 through 30 AWG.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Welding Cable."

WIRE, MISCELLANEOUS (ZMHX)

GENERAL

This category covers different constructions of wire and cable, each intended for the particular application marked on the product, tag, carton or reel. Included in this category are: Brake Control Cable; Bus Drop Cable; Cathodic Protection Cable; DLO Cable (cable for locomotives and other transportation applications); Festooning Cable; Flexible Power Feed Cable, in sizes 4 AWG through 250 kcmil, for use as power leads to equipment submerged in liquefied gases; Golf Course Sprinkler Wire; Heat Resistant Wire; Inductive Loop Detector Lead-in Cable; Irrigation Machine Feeder Cable; Low-ohmic Distribution Cable; Mine Power Cable for use in special applications not in accordance with NFPA 70, "National Electrical Code"; Mineral Insulated Metal-sheathed Control Cable; Pendant Cable; Power Traction Cable; PVC-jacketed, Thermoplastic Polyolefin-jacketed and Thermoplastic CPE-jacketed Thermoset-insulated Wire; Railroad Underground Power Cable; Recreational Vehicle Cable (low voltage); RF Coaxial Cable; SAE Types TWP, GPT, HDT, TXL, GXL and SXL; Satellite Antenna Cable; Slotted Coaxial Cable; Strobe Flash-head Cable; Submersible Pump Cable (TPE or PE insulation); Telephone Central Office Power Cable; Telephone Drop Wire; Tracer Wire; Underground Low-energy Circuit Cable; Underground Signal Cable and Vault Lacing Cable.

PRODUCT MARKINGS

Information regarding installation, ampacity, etc., where appropriate, is included in the marking found on the tag, reel or carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are specified in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the specific name of the wire, such as "Telephone Drop Wire." The name "Miscellaneous Wire" is not used.

WIRE CONNECTORS (ZMKQ)

CRIMP TOOLS CLASSIFIED FOR USE WITH SPECIFIED WIRE CONNECTORS (ZMLS)

USE

This category covers crimp tools that have been investigated and found suitable for use with specific Listed Grounding and Bonding Equipment (KDER), Quick Connect Terminals (RFWV), Wire Connectors and Soldering Lugs (ZMVV) and Wire Connector Adaptors (ZMOW) in accordance with the Classification Mark and a compatibility list provided with the tool.

The inside cover of the tool storage case or a permanently attached label to the tool itself contains a compatibility list that tabulates the company name and catalog number of the crimp tool and the company name, catalog number, wire size and number of crimps of the applicable UL Listed grounding and bonding connectors, quick connect terminals, wire connectors and wire connector adaptors for which the crimp tool has been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1976, "Outline of Investigation for Crimp Tools for Use with Wire Connectors."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Crimp Tool for Use with UL Listed Grounding and Bonding Connectors, Quick Connect Terminals, Wire Connectors and/or Wire Connector Adaptors Identified in the Instructions Provided," and a control number.

WIRE CONNECTOR ADAPTORS (ZMOW)

This listing covers both insulated and uninsulated adaptors that are to be installed on the end of wire prior to its connection to Listed wire con-

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nectors, or to connectors used in Listed equipment, following the instructions provided with the adaptor by the manufacturer.

Adaptors are for use in accordance with the National Electrical Code.

The marking "AL" or "AL-CU" on an adaptor indicates the type of conductor(s) for which the adaptor has been evaluated. These adaptor have been investigated for attachment to Listed wire connectors or connectors in Listed equipment that are identified as suitable for aluminum and/or copper conductors.

Adaptors are suitable for use at not greater than 75 C (167 F) ampacities as specified in Table 310-16 of the National Electrical Code.

A 75 or 90 C temperature rating is marked on the adaptor. The rating may be represented by a 7 or 9 associated with the marking "AL" or "AL-CU", i.e. AL7, AL9, AL7CU or AL9CU.

For an insulated adaptor this temperature rating does not exceed the temperature rating of the insulation.

Insulated adaptors have insulation suitable for a voltage rating of 600 V or less as indicated by marking on or in the unit container.

Insulated adaptors are marked on or in the unit container to indicate the maximum operating temperature for which the insulating cover is suitable.

Adaptors to be assembled to wire using a special tool are to be assembled using the tool specified by the manufacturer in the instructions which are provided in the unit container in which the adaptors are packaged. Such tools are identified by appropriate marking.

Adaptors accommodate a single conductor of stranded wire, unless otherwise noted in the installation instructions.

The basic standard used to investigate products in this category is UL486B, "Wire Connectors for Use With Aluminum Conductors".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Wire Connector Adaptor".

WIRE CONNECTORS AND SOLDERING LUGS (ZMVV)

This listing covers both insulated and uninsulated pressure terminal connectors and pressure cable connectors, and also insulating caps or covers intended for use with specific wire connectors, and soldering lugs.

Wire Size — Wire connectors are listed for No. 30 AWG or larger copper conductors and/or No. 12 AWG or larger aluminum or copper-clad conductors. They are for use in accordance with the National Electrical Code.

The wire size or range of wire sizes for which a connector has been found suitable is marked on the connector or the unit container.

Conductor Material — Wire connectors or the unit containers are marked with the type of conductor material(s) as follows:

Marking	For Use With
"AL"	Aluminum
"CC"	Copper-Clad Aluminum Only
"AL-CU" or "CU-AL"	Copper, Aluminum or Copper-Clad Aluminum
"CC-CU" or "CU-CC"	Copper or Copper-Clad Aluminum
"CU", "CU-CU", or equivalent wording	Copper only

Except as otherwise noted on or in the shipping carton, copper, aluminum, or copper clad aluminum conductors are not to be used in direct physical contact in the same connector. A wire connector recognized for securing an aluminum wire in combination with a copper or copper-clad aluminum wire, as noted on or in the shipping carton, where physical contact occurs between the wires of different metals, is limited to dry locations only and is so marked, i.e. "AL-CU (dry locations)".

Conductor Termination Compound — Some connectors are shipped pre-filled with conductor termination compound (antioxidant compound). For non-pre-filled connectors, conductor termination compound may be used if recommended by the connector manufacturer as preliminary preparation of the conductor. Wire brushing of the conductor may also be performed if recommended. Also see guide DVIW.

Temperature Rating:

(A) Equipment Use

Equipment wiring requirements may restrict the sizing and temperature ratings of connected conductors. Equipment requirements may limit 90 C or higher rated conductors to 60 C or 75 C ampacity in accordance with the guide information for (AALZ) at the front of this Directory.

(B) General Use

Connectors rated 75 C are for use at ampacities not greater than those for 75 C rated conductors and connectors rated 90 C are for use at ampacities not greater than those for 90 C rated conductors. These temperature ratings may be represented by a 7 or 9 associated with the marking "CU", "AL" or "AL-CU", i.e. "AL9", "AL9CU", "AL7CU", "CU7", or "CU9".

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Connectors are rated and marked as follows:

Type Connector	Rated For	Wire Range	Temp Marking	Rating
Terminal (CU body)	CU only	All	Not Marked	90
Terminal (AL body)	CU only	All	75 or 90	As Marked@
Terminal	AL or AL-CU	All	75 or 90	As Marked@
Cable	CU only	22 - 6	Not Marked	90
Cable (CU body)	CU only	4 and larger	Not Marked	90
Cable (AL body)	CU only	4 and larger	75 or 90	As Marked
Cable	AL or AL-CU	22 - 6	Not Marked	75
Cable	AL or AL-CU	4 and larger	75 or 90	AsMarked

@Pressure terminal connectors rated for 6 AWG or smaller conductors may have the markings on the connector, the unit container, or on an information sheet packed in the unit container.

Insulation Temperature Rating — Insulated connectors, insulating caps and insulating covers have an insulation temperature rating which is marked on the device or the unit container.

Voltage Rating — Insulated connectors, insulating caps and insulating covers have voltage ratings for which they have been found acceptable. The voltage ratings may be 300 volts maximum; 600 volts maximum; or 600 volts maximum building wire, 1000 volts maximum in signs or fixtures. The voltage rating is marked on the device or the unit container.

Uninsulated pressure terminal connectors and uninsulated pressure cable connectors are for general use in circuits up through 2000 volts and for specific applications in circuits up through 8000 volts where installed in accordance with Section 310-6 of the National Electrical Code.

Exception No. 1: Uninsulated pressure terminal connectors (compression tool applied) that are for use with aluminum conductors only (AL) or are for use with aluminum, copper, or copper-clad aluminum conductors (AL-CU) and that are marked "HV" may be used in circuits 2001 volts up through 35,000 volts. The "HV" marking may appear on the smallest unit container.

Exception No. 2: Uninsulated pressure terminal connectors (compression tool applied) that are for use with copper conductors only may be used in circuits 2001 volts up to 35,000 volts. The marking "HV" is optional. The "HV" marking may appear on the smallest unit container.

Where connectors are used in circuits up through 35 kV, the stress-relief insulation prescribed by the manufacturers of shielded cables is to be provided as these connectors are installed.

Special Tools — Connectors to be assembled to wire using a special tool are to be assembled using the tool specified by the manufacturer on or in the connector shipping carton. Such tools are identified by appropriate marking.

Use In Service Equipment — Where wire connectors are used as a part of service equipment, dead front switchboards, panelboards, meter sockets, enclosed switches, and circuit breakers, reference should be made to the General Information for these categories concerning the use of the connectors. When pressure wire connectors suitable for use with aluminum conductors are employed in equipment, the suitability of this equipment for wiring with aluminum conductors will be indicated by a marking independent of any marking on the wire connector.

Pressure terminal connectors are for general use and are designed to establish a connection between one or more wires to a terminal plate or stud, or to any similar device which may or may not be directly attached to another wire by means of mechanical pressure without the use of solder. Pressure terminal connectors accommodate one solid or stranded wire unless otherwise noted on or in the shipping carton or on the connector.

Pressure cable connectors are for general use and are designed to establish a connection between one or more conductors by means of mechanical pressure without the use of solder. Pressure cable connectors accommodate two solid and/or stranded wires unless otherwise noted on or in the shipping carton or on the connector.

Insulating caps or covers are for general use when installed on specific connectors. Information covering use of the caps or cover on specific connectors appears on the cartons in which the caps or covers are packaged.

Soldering lugs are terminal connectors designed for attachment to wire by means of solder.

Some of the listings of pressure terminal connectors and soldering lugs include varieties having open slots. Such varieties are Listed for use only in applications where supplementary securing means prevent disconnection resulting from slight loosening of the clamping means.

Stage type connectors of the receptacle type are listed under the heading "Receptacles for Attachment Plugs and Plugs-Stage Type".

The basic standards used to investigate products in this category are UL486A, "Wire Connectors and Soldering Lugs for Use With Copper Conductors"; UL486B, "Wire Connectors for Use With Aluminum Conductors"; and UL486C, "Splicing Wire Connectors".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Direc-

tory) together with the word "LISTED", a control number, and the product name as appropriate: "Wire Connector", "Soldering Lug", or the name of the specific type of product as shown in the individual Listings.

WIRE CONNECTORS, INSULATED FOR USE WITH UNDERGROUND CONDUCTORS (ZMWQ)

USE

This category covers insulated pressure wire connector systems intended for direct burial, below grade use, or similar damp or wet locations. These requirements cover a complete system or insulating caps, covers, resins, tubing and tapes that are part of the system for use with specific wire connectors where the seal is made at the conductor. Pressure wire connectors may or may not be provided with the system.

CONDUCTOR TYPES

Insulated wire connector systems are intended for use with Type USE, RHW, or XHHW, No. 30 AWG through 2000 MCM copper or aluminum conductors with currents not exceeding the ampacity of insulated conductors rated either 75°C or 90°C and intended for use at 600 V or less.

Insulated wire connector systems may also be intended for use with conductors of single or multiple conductor underground feeder cable (Type UF), golf course sprinkler cable, underground low energy cable, irrigation cable, or other cable with insulation acceptable for direct burial, below grade use, or wet locations.

PRODUCT MARKINGS

An insulating system or parts of a system not provided in the same unit container with a pressure wire connector are marked with (1) the manufacturer's name and (2) the catalog number or equivalent description of the connector intended to be used. Alternatively, the information may be marked on the unit container or on an information sheet provided in each unit container.

An insulating system not intended for direct burial is marked "Not for Direct Burial Use" or the equivalent.

An insulating system may additionally be marked "Raintight," "Watertight," or "Submersible," as applicable.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 486D, "Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wire Connector system for use with underground conductors."

WIRE CONNECTORS AND SOLDERING LUGS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (ZNKD)

This category covers products that have been investigated in accordance with IEC Publications 60998-1 and 60998-2-4, "Connecting Devices For Low Voltage Circuits Household and Similar Purposes, Particular Requirements for Twist-On Connecting Devices." These products may also be evaluated for and provided with the Listing Mark for Wire Connectors and Soldering Lugs (ZMVV). For additional information see Wire Connector and Soldering Lugs (ZMVV) in the Electrical Construction Equipment Directory.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product or unit container is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

For those products which are also Listed, the Classification Marking for these products includes the appropriate Listing Mark and the statement: "Also Classified by Underwriters Laboratories Inc. in accordance with IEC Publications 60998-1 and 60998-2-4."

For those products which are not Listed, the Classification Marking consists of a statement "Classified by Underwriters Laboratories Inc. in accordance with IEC Publications 60998-1 and 60998-2-4" and a control number. The Classification Marking may include the symbol UL in a circle in conjunction with the word "Classified".

POSITIONING DEVICES (ZODZ)

GENERAL

This category covers cable ties, cable tie mounts, and similar types of related hardware for field installation in accordance with NFPA 70, "National Electrical Code." The investigation of these products includes consideration of the rated mechanical strength, maximum operating temperature, smoke and heat generation, corrosion resistance and weatherability characteristics as appropriate for the product.

MARKINGS

The product or the smallest unit package in which the product is shipped is marked with the product's maximum load and thermal ratings along with the company name and catalog designation.

Products covered under this category have not been evaluated for outdoor use unless marked "For Use Outdoors" or similar wording, in which case they have been found acceptable for both indoor and outdoor use.

Containers for those devices which have been investigated to determine their suitability for use in air handling areas are marked either "Suitable for use in air handling spaces in accordance with Sec 300.22(C) and (D) of the National Electrical Code" or "Suitable for use in air handling spaces in accordance with Sec 300.22(B), (C) and (D) of the National Electrical Code," as appropriate.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1565, "Positioning Devices."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit package in which the product is shipped with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Positioning Device" or other appropriate product name as shown in the individual Listings.

WIRE-PULLING COMPOUNDS (ZOKZ)

USE

This category covers wire-pulling compounds intended for use as lubricants in installing electrical conductors in raceways. These compounds have been investigated to determine their compatibility with conductor insulation and coverings.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wire Pulling Compound."

WIREWAYS, AUXILIARY GUTTERS AND ASSOCIATED FITTINGS (ZOYX)

USE AND INSTALLATION

This category covers metallic and nonmetallic wireways, auxiliary gutters, and associated fittings for installation in accordance with Articles 362, 374 and 645 of the National Electrical Code, NFPA 70 (NEC).

Products installed in accordance with the product markings and manufacturer's instructions are suitable for use as equipment grounding conductors.

PRODUCT MARKINGS

Products that have been investigated to determine that they are rain tight are marked "Raintight."

Nonmetallic products that have been investigated to determine their suitability for exposure to sunlight are marked "Sunlight Resistant."

Nonmetallic products that have been investigated to determine their suitability for use in an air-handling space in a location subject to Article 645 of the NEC are so rated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate metallic products in this category is UL 870, "Wireways, Auxiliary Gutters and Associated Fittings."

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The basic standards used to investigate nonmetallic products in this category are UL 870 and UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Wireway or Auxiliary Gutter," "Wireway," "Auxiliary Gutter," "Wireway or Auxiliary Gutter Fittings," "Wireway Fittings" or "Auxiliary Gutter Fittings."

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PART II

Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ)

I. GENERAL

Part I of this directory includes electrical equipment intended for use in and relating to Class I, II and III, Division 1 and 2 hazardous locations. See **Part II** for electrical equipment intended for use in Class I, Zone 0, 1 and 2 hazardous locations.

Unless equipment is identified in 1) the product category title as relating to hazardous (classified) locations or 2) the individual Listing as apparatus for use in unclassified (ordinary) locations, all product categories contain electrical equipment for use in Class I, II and III hazardous locations.

The Listings and Classifications pertain to equipment that has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of NFPA 70, "National Electrical Code" (NEC), or United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive). Those products evaluated for conformity to the installation and use provisions of the United States Coast Guard Regulations are identified in the general Guide Information for each product category or the individual Listings for the product. Attention is called to the limitations of the Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Electrical equipment for unclassified (ordinary) locations is covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory.

Equipment for unclassified (ordinary) locations is covered in UL's other product directories.

III. HAZARDOUS LOCATIONS – GENERAL INFORMATION

Hazardous locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors, or flammable liquids (Class I), combustible dusts (Class II), or ignitable fibers or flyings (Class III).

There are two independent classification systems. One system, found in Article 500 of the NEC, divides all hazardous locations into Classes, Divisions and Groups (see Part I of this directory). Division 1 is a location where a flammable or combustible atmosphere is present under normal operating conditions. Division 2 is a location where a combustible atmosphere is present only under abnormal conditions.

The other classification system, found in Article 505 of the NEC, divides only Class I hazardous locations into Zones and Gas Groups (see Part II of this Directory). Zone 0 is a location where an explosive or flammable atmosphere is present continuously or for long period of time. Zone 1 is a location where the explosive or flammable atmosphere is likely to occur during normal operation. Zone 2 is a location where the explosive or flammable atmosphere is not likely to occur in normal operation and, if it occurs, will exist for only a short time.

Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself. In addition, intrinsically safe circuit wiring terminals and intrinsically safe equipment is marked "Intrinsically Safe."

Suitability of Listed or Classified Equipment

Equipment intended for use in a hazardous location Class and Group and marked "Division 1" or "Div. 1" or without any Division indication is suitable for use in both Division 1 and 2 locations as defined in the NEC, and in unclassified locations. Equipment marked "Division 2" or "Div. 2" is suitable only for Division 2 and ordinary locations. In addition, the NEC permits equipment Listed for Class I, Division 1 to be used in a Class I, Zone 1 or 2 location of the same gas group and with a suitable temperature class. Equipment Listed for Class I, Division 2 is permitted to be used in a Class I, Zone 2 location of the same gas group and with a suitable temperature class. Zone equipment is only permitted in Division classified areas if it is properly marked. Equipment marked for use in or relating to Class I, Zone 0 area is also suitable for use in or relating to Zones 1 and 2 areas of the same gas group and with suitable temperature class. Equipment marked for use in or relating to Class I, Zone 1 areas is also suitable for use in or relating to

Class I, Zone 2 areas of the same gas group with suitable temperature class. Equipment marked for use in or relating to Class I, Zone 2 areas is suitable only for use in or relating to those areas classified as Class I, Zone 2, and in unclassified locations.

Environmental Considerations

Unless the equipment is marked otherwise, it is to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions will be marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See “Enclosure Considerations for All Equipment” below for more information.

Ambient Temperatures

Unless the equipment is marked otherwise, it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F). Use of equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within explosion-proof equipment.

Overload Protection

Equipment should be installed in circuits with overload and short-circuit protection for established ratings. The ampere or wattage marking on power consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Enclosure Modification and Maintenance

The integrity of an enclosure for explosion-proof or dust-ignition-proof equipment must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of the enclosure to contain the explosion or to exclude dust. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

Gas, Vapor and Dust Groups

The following paragraphs group flammable and explosive mixtures of specific gases, vapors and dusts in accordance with the NEC classifications noted in Article 500. For a complete list of group classifications for Class I and II materials where used within Divisions 1 or 2, see NFPA 497, “Recommended Practice for the Classification of Gases, Vapors and Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas” and NFPA 499, “Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.”

Class I Equipment

Equipment for use in Class I hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of area classification for Divisions 1 and 2, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group A — Atmospheres containing acetylene.

Class I, Group B — Atmospheres containing acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, or fuel and combustible process gases containing more than 30 percent hydrogen by volume.

Class I, Group C — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group D — Atmospheres containing acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Zone 0, 1, 2 Gas Groups

For purposes of area classifications for Zones (Part II of this directory) such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group IIA — Atmospheres containing acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Group IIB — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, ethyl nitrate, or gases or vapors of equivalent hazard.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1, and 2 Gas Groups. The gases shown are representative of others in the Group.

Division 1 & 2

A (acetylene)
 B (hydrogen)
 C (ethylene)
 D (propane)

Zone 0, 1 & 2

IIC (acetylene and hydrogen)
 IIC (acetylene and hydrogen)
 IIB (ethylene)
 IIA (propane)

Class I Temperature Considerations

The marked temperature class (T-code) of the equipment is based on either the maximum external temperature or internal temperature of the equipment, depending on the protection method used.

For Class I, Division 1 and Zone 1 equipment, in general, the operating temperature is the maximum temperature of external surfaces of the equipment. For Class I, Division 2 and Zone 0 or 2 equipment, in general, the operating temperature is the maximum temperature of all parts of the equipment, including internal parts, that may be exposed to the flammable material.

Equipment is required to be marked with the operating temperature or temperature class (T-code) if the maximum operating temperature is more than 100°C (212°F).

This temperature marking shall not exceed the ignition temperature of the specific gas or vapor to be encountered.

Class I Equipment in Class II Locations

Equipment Listed or Classified for use in Class I locations is not necessarily acceptable for Class II locations as it may not be dusttight or operate at a safe temperature when blanketed with dust.

Class II Equipment

Dust-ignition-proof equipment for use in Class II hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of area classification, the NEC groups combustible dust-air mixtures as follows:

Class II, Group E — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present an equivalent hazard.

Class II, Group F — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8 percent total volatile material (carbon black per ASTM D1620, charcoal, coal and coke dusts per ASTM D271) or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

Class II, Group G — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

Class II Equipment in Class III Locations

Equipment Listed or Classified for Class II, Group G hazardous locations is also suitable for use in Class III locations, except for 1) those products marked for Division 2 only, and 2) fan-cooled type motors where there is a very large amount of lint or combustible flyings which are likely to choke or clog the air passages of the motor.

Class III Equipment

Equipment for use in Class III hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of easily ignitable fibers or flyings. These fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be evaluated for any or all of the Classes and Groups as defined in the NEC. In an intrinsically safe circuit, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Article 504 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and which are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous locations unless use in hazardous locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous Locations

Equipment relating to hazardous locations includes 1) devices, products, and materials for use in locations where it is necessary for safety to avoid the accumulation of static electricity on personnel or equipment, 2) anesthesia equipment, 3) devices not intended for operation in hazardous locations, but which are designed to indicate certain potentially dangerous conditions with respect to such

locations, 4) electrical equipment not intended for installation in hazardous locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the Listings and Classifications, and 5) paint spray booths.

Enclosure Considerations for All Equipment

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist inspection authorities, electrical equipment Listed or Classified for use in and relating to hazardous locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use.
2	Indoor use, limited amounts of falling water.
3R	Outdoor use, undamaged by the formation of ice on the enclosure.**
3	Same as 3R plus windblown dust.
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden.
4	Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure.**
4X	Same as 4 plus resists corrosion.
5	Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Same as 3R plus entry of water during temporary submersion at a limited depth.
6P	Same as 3R plus entry of water during prolonged submersion at a limited depth.
7	Indoor use in locations classified as Class I, Division 1, Groups A, B, C or D -- air-break equipment.
8	Indoor use in locations classified as Class I, Division 1, Groups A, B, C or D -- oil immersed equipment.
9	Indoor use in locations classified as Class II, Division 1, Groups E, F or G -- air-break equipment.
12, 12K	Indoor use, dust, dripping noncorrosive liquids.
13	Indoor use, dust, spraying water, oil and noncorrosive coolants.

*All types of enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All types of enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

The marking of enclosure type numbers 7, 8, and 9 is optional as the marking of Class and Group is required. The marking of Division 1 is optional for equipment suitable for Divisions 1 and 2.

In some cases, individual appliances and equipment may be marked "Raintight" or "Rainproof" indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as "Raintight" such exposure will not result in entrance of water. For equipment designated as "Rainproof" such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, "Classification of Degrees of Protection Provided by Enclosures," provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure (or IP rating) as follows:

First Characteristics Numeral	Protection Against Ingress of Solid Foreign Objects
IP0X	Not evaluated
IP1X	50 mm diameter or larger
IP2X	12.5 mm diameter or larger
IP3X	2.5 mm diameter or larger
IP4X	1.0 mm diameter or larger
IP5X	Dust protected
IP6X	Dusttight
Second Characteristics Numeral	Protection Against Ingress of Water with Harmful Effect
IPX0	Not evaluated
IPX1	Vertically dripping
IPX2	Dripping (15 degree tilted)
IPX3	Spraying
IPX4	Splashing
IPX5	Jetting
IPX6	Powerful jetting
IPX7	Temporary immersion
IPX8	Continuous immersion

Fittings at Supply Entries

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

Wiring Considerations for All Equipment

Appliances and Utilization Equipment Terminations — Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations — Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75C” or “60/75C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75°C or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75°C or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75°C or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper-clad Aluminum Conductors — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper, and copper-clad aluminum conductors.

Wire Connectors — Combinations of dissimilar conductors in terminals or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wiring Connectors and Soldering Lugs (ZMVV) in UL’s Electrical Construction Equipment Directory.

Terminals — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

Seals in Conduit and Cable Systems — Equipment with a factory-installed conduit seal is marked “Leads factory sealed” or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 501.5 of the NEC should be determined.

IV. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

V. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VI. MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been evaluated in accordance with the applicable requirements of UL, the United States Coast Guard, the American Boat and Yacht Council Inc. and the National Fire Protection Association. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire. product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

AIR CONDITIONING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (AHSY)

AIR CONDITIONERS FOR USE IN HAZARDOUS LOCATIONS (AIDR)

Products covered in this section include central cooling air conditioners and room air conditioners.

Air Conditioners, Central Cooling for Use in Hazardous Locations (AIIIS)

This category covers central cooling air conditioners of the unitary type for use in Hazardous Locations. The equipment is rated 135,000 Btu per hour or less, 600 v maximum, and is to be installed in accordance with the requirements of the National Electrical Code.

Equipment to be connected to an air duct system is intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilation Systems, No. 90A, or for Warm Air Heating and Air Conditioning Systems, No. 90B.

These air conditioners consist of a single factory made assembly. The system is charged with refrigerant and tested for leakage prior to shipment from the factory.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on a wiring diagram and/or marking attached to the air conditioner.

In air conditioners employing two or more motors or a motor and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground fault protection requirements of Sec. 430-53(c) of the 1984 Edition of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the

equipment has been investigated and found acceptable. Where the marking specifies fuses, or “HACR Type” circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Air conditioners for duct connection incorporating factory-installed electric resistance heaters are identified in the individual listings. In such units, the overcurrent protective devices are included as an integral part of the air conditioner. The effect of heating appliances with which equipment covered by these listings may be integrated has not been investigated.

Where a clearance is required to be maintained to combustible construction, the clearance is designated in the individual listings and is also marked on the air conditioner. Unless otherwise indicated, the designated clearances (other than “zero”) are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

Unless otherwise specified in the listing and marking, the unit may be installed on combustible flooring.

Some air conditioners may be designed for installation with the indoor side located in a non hazardous location and the outside in a Division 2 hazardous location.

Marking on the product and the installation instructions identify units intended for outdoor exposure or partial outdoor exposure.

The basic standard used to investigate products in this category is UL465, “Central Cooling Air Conditioners”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Central Cooling Air Conditioner For Use In Hazardous Locations”.

Room Air Conditioners for Use in Hazardous Locations (AINU) USE AND INSTALLATION

This category covers room air conditioners for use in hazardous locations. They are encased assemblies designed as a unit and intended as the prime source of refrigeration and dehumidification, basically intended to serve a single room, zone or space. They are intended for installation in windows or through walls. These units employ alternating current, her-

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metic refrigerant motor compressors with factory charged refrigeration systems and include a means for circulating air. The effect of in-wall units on the fire resistance rating of the wall has not been investigated.

Permanently connected units are to be connected only to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. The marked branch circuit overcurrent device protection is the maximum for which the unit has been investigated and found acceptable. If time delay fuses are required for starting, the unit is marked to this effect.

Cord-connected units which require a time delay fuse or circuit breaker to permit motor restarting are marked to this effect.

Some room air conditioners may be designed for installation with the indoor side being located in a room purged and pressurized in accordance with NFPA 496, "Standard for Purged and Pressurized Enclosures for Electrical Equipment," to become an unclassified (ordinary) location, and the outdoor side in a Division 2 hazardous (classified) location. Marking on the product and in the installation instructions identify units intended for this use.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 484, "Room Air Conditioners," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" UL 1604, "Electrical Equipment for Use in Class I II, Division 2, and Class III Hazardous (Classified) Locations" and UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Room Air Conditioner for Use in Hazardous Locations."

AIR FILTERING APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (AISX)

This listing covers portable or stationary, air filtering appliances intended for window, floor table and similar mounting. The appliances consist primarily of air circulating fans and mechanical filters.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Air Filtering Appliance for Use in Hazardous Locations," or other appropriate product name.

AIR SAMPLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ALOA)

This category covers air sampling pumps, sample draw pumps and similar equipment.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Sampling Equipment for Use in Hazardous Locations" or "Air Sampling Pumps for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

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ALARM SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (ALSY)

INTRUSION DETECTION UNITS FOR USE IN HAZARDOUS LOCATIONS (ARCX)

This category includes various electronic devices which may be used to form a complete protective system.

Electronic units include those which utilize rays (photo-electric), electromagnetic waves, ultrasonic radiation or other electronic principles to signal intrusion or movement within mercantile premises or approaches to safes, stockrooms, etc.

The electronic units listed herein have been examined for fire and electrical shock, for reliability of operation and for use in hazardous locations. The effect of radiation on radio communication or radio navigation has not been investigated. The Federal Communications Commission should be consulted for regulations governing the use and operation of radiation devices.

The basic standards used to investigate products in this category are UL639, "Intrusion Detection Units," UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations," UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations" and UL1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2 and Class III, Divisions 1 and 2."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Intrusion Detection Unit," "Intrusion Detection Unit Power Supply" or "Intrusion Detection Unit Accessory".

The product name may be followed by "for Use in Hazardous Locations" or "(Associated Apparatus)".

ALTERNATORS, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (ARDK)

Electric Alternators for Class I, Division 1, Class II, Division 1 and Class III Locations.

The basic standard used to investigate products in this category is UL1203, "Standard for Explosion Proof and Dust Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL508, "Standard for Industrial Control Equipment."

Electric Alternators for Class I, Division 2, and Class II, Division 2 Locations.

For Class I, Division 2 locations, the enclosure may be of the open or totally-enclosed type. The Group designation is marked unless the alternator is acceptable for Groups A, B, C and D. The alternator is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated amperes marked on the alternator, if the temperature is greater than 100 degrees C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically-sealed enclosure, constructed with current-interrupting contacts immersed in oil, located in a nonincendive circuit or located in a purged and pressurized enclosure.

For Class II, Division 2 Locations, the enclosure is of the totally enclosed type. The alternator is marked with the operating temperature or operating temperature code designating the maximum external temperature determined at rated amperes (as marked on the alternator), when operating in free air (not dust blanketed), if the external temperature is greater than 100 degrees C.

The basic Standards used to investigate alternators for Division 2 locations in this category are UL1604 "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous Locations", and UL508, "Standard for Industrial Control Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Alternator For Hazardous Locations".

LUBRICANT DISPENSING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (BAYZ)

This category includes equipment for dispensing lubricants such as lubricating oils and greases.

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations", UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Lubricant Dispensing Equipment for Hazardous Locations", "Lubricant Dispenser for Hazardous Locations" or other appropriate product name as shown in the individual Listing.

BRAKES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (BHIX)

The brakes covered by this category are intended primarily for holding purposes, but may be used for stopping light inertia loads.

This category includes two types of electric brakes. One type is intended to be attached directly to a Listed motor at the factory of the motor manufacturer in accordance with instructions provided by the brake manufacturer. The other type is provided with a mounting bracket and is coupled to the motor.

The Listing Mark on a brake applies to the brake only, not to driving equipment such as a motor.

Electric Brakes for Class I, Division 1, Class II, Division 1 and Class III Locations.

The basic standard used to investigate Division 1 products in this category is UL 674, "Standard for Electric Motors and Generators for Use in Hazardous (Classified) Locations."

Electric Brakes for Class I, Division 2, and Class II, Division 2 Locations.

For Class I, Division 2 locations, the enclosure may be of the open or totally-enclosed type. The Group designation is marked unless the brake is acceptable for Groups A, B, C and D. The brake is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated full-load torque marked on the brake, if the temperature is greater than 100 degrees C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically-sealed enclosure, constructed with current-interrupting contacts immersed in oil, located in a nonincendive circuit or located in a purged and pressurized enclosure. If the brake is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor to which the brake is coupled is deenergized, and vice-versa.

For Class II, Division 2 Locations, the enclosure is of the totally enclosed type. The brake is marked with the operating temperature or operating temperature code designating the maximum full load external temperature determined at rated full-load torque (as marked on the brake), when operating in free air (not dust blanketed), if the external temperature is greater than 100 degrees C.

The basic Standards used to investigate brakes for Division 2 locations in this category are UL Subject 1836, Outline of Investigation For Electric Motors and Generators For Use In Class I, Division 2, and Class II, Division 2 Hazardous (Classified) Locations, and UL1604 "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Electric Brake For Hazardous Locations".

CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (CYMX)

This category covers combination termination and sealing fittings for threaded connection of cables to equipment in Class I, Division 1 and Division 2, and/or Class II, Division 1 and 2 hazardous locations, as indicated in the individual Listings. They are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of Listed cables of the type indicated in the individual Listings. No splices of conductors are to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer's instructions.

The basic standard used to investigate products in this category is UL 2225, Standard for "Metal-Clad Cables and Cable-Sealing Fittings For Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Type + Cable Sealing Fitting for Use in Hazardous Locations".

+Generic cable designation, such as MC, TC, etc.

CAMERA EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (CYPH)

This category includes camera equipment such as cameras and pan and tilt drives.

The basic standards used to investigate products in this category are UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL508, "Industrial Control Equipment."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number and the following product name: "Camera for Use in Hazardous Locations", "Pan and Tilt Drive for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

CASTERS, RUBBER, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (CZXZ)

These products are electrically conductive rubber casters which have metal shafts and forks, and are provided with conductive rubber composition wheels or with metal wheels having conductive rubber tires. The casters are intended for use on portable equipment in hospital operating rooms.

Tests indicate that static electrical charges are discharged through these casters when in contact with ground or suitable electrically conductive floor, and that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA No. 99.

Oil is injurious to rubber compounds and impairs the electrically conductive properties of these casters. The use of floor oils and oily sweeping compounds should therefore be avoided. Insulating floor waxes should not be used.

Conductive floors are required for the proper dissipation of static electrical charges by these casters. Please refer to listings of Electrically Conductive Floorings.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Electrically Conductive Rubber Caster Relating to Hazardous Locations".

CENTRIFUGES FOR USE IN HAZARDOUS LOCATIONS (DAZV)

This category covers Centrifuges for use in Hazardous Locations.

These products have been investigated with respect to risk of explosion, fire, electric shock, and injury to persons.

The basic standards used to investigate products in this category are UL1203 "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL674, "Electric Motors and Generators for Use in Hazardous (Classified) Locations" and UL1262 "Laboratory Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Centrifuge for Use in Hazardous Locations".

CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (DKAR)

This listing covers circuit breakers which, unless otherwise noted, are of the manually operable, air break type, providing automatic overcurrent protection.

Circuit breakers and circuit breaker enclosures as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings shall be independent of any marking on terminal conductors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of Type R, or other 60 C wire, in circuits rated 100 amp or less, and the use of Type RH, or other 75 C wire, for higher amp rated circuits.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is to be used with aluminum wire.

BRANCH CIRCUIT AND SERVICE FOR USE IN HAZARDOUS LOCATIONS (DKNZ)

This category covers thermally responsive circuit breakers designed to carry rated current at ambient temperatures of 40°C or less and marked "40C."

Circuit breaker enclosures are for use only with Listed mechanisms specified in the enclosure markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 877, "Circuit Breakers and Circuit Breaker Enclosures for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker for Hazardous Locations" or "Circuit Breaker Enclosure for Hazardous Locations."

CLEANING MACHINES FOR USE IN HAZARDOUS LOCATIONS (DMRR)

This category includes portable vacuum cleaners provided with special suction attachments intended to facilitate cleaning operations, such as crevice tools, brushes, and so forth. These attachments are covered in the listings.

Some vacuum cleaners are designed specifically to pick up water in connection with floor scrubbing operations; such cleaners are so indicated in the individual listings.

Connections to supply lines require the use of receptacles with plugs, or receptacles with plugs interlocked with snap switches or their equivalent, Listed for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary. Terminal connections should be properly made and maintained.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only when necessary.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cleaning Machine for Use in Hazardous Locations".

COMBUSTION DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (DUFK)

These devices are electronically operated combustion detectors intended to be used on gas or oil-burning equipment.

The basic standards used to investigate products in this category are UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2 and Class III Hazardous (Classified) Locations" and UL 1203, "Explosion-proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations" as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Combustion Detection Equipment for Use in Hazardous Locations", "Combustion Detectors for Use in Hazardous Locations", or other appropriate product name as shown in the individual listing.

CONDUCTIVITY TESTING EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (DVRX)

USE

This category covers equipment intended for use in unclassified (ordinary) locations to measure the electrical resistance (conductivity) of floors, equipment and personnel before use in hazardous locations where reduction of electrostatic hazards is advisable. The measurements are made immediately before entry of the personnel or use of the floors and equipment in the hazardous locations.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conductivity Testing Equipment Relating to Hazardous Locations."

CONDUIT FITTINGS FOR USE IN HAZARDOUS LOCATIONS (EBNV)

GENERAL

This category covers the following types of fittings:

Conduit fittings for draining or venting are for mounting in existing conduit openings of conduit boxes and electrical devices. Fittings for draining or venting which do not mount in existing conduit openings, such as those with threads smaller than 1/2 in. trade size, are covered under UL's Component Recognition Program. Only drain fittings with shut-off valves should be installed in oil immersed devices and only where there is close supervision so that the fittings will not be left open to permit loss of oil.

Conduit fittings for sealing are for use only with sealing compounds specified by the manufacturer in instructions furnished with the fitting. These devices are intended for use in sealing conductors in conduit lines. No splices of conductors should be made in the fittings. Instructions with the fitting indicate any restriction on position or location of the sealing fittings. The maximum number and size of conductors that may be installed within the sealing fitting are stated in the manufacturer's installation instructions provided with each fitting.

Conduit unions are for use in threaded rigid conduit wire raceways. 90-degree box connector type conduit unions are for use at threaded openings of devices in accordance with requirements of NFPA 70, "National Electrical Code" (NEC).

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Universal type box connector conduit unions are for use at threaded openings of devices in accordance with requirements of the NEC and may be assembled at angle greater than 90 degrees.

Flexible connection fittings are substantial fittings having insulated inner wall and flexible metal outer wall encased in metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

Prospective users should first ascertain from Authorities Having Jurisdiction under what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short radius capped elbows are intended for use where it is desirable to have a 90 degree bend and where wires may be guided when being pulled through the conduit line.

Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous location devices and extra hard service type flexible cord, having a grounding conductor, for portable equipment.

Fittings which are rain tight or concrete tight are so marked, or this information is provided with the fitting.

Cast-aluminum alloy conduit fittings covered under this category are not considered acceptable for installation in concrete or cinder fill, unless protected with asphalt base paint or the equivalent.

RELATED PRODUCTS

See Outlet Boxes for Use in Hazardous Locations (QBRC).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit Fitting for Hazardous Locations" or other appropriate product name as shown in the individual Listings.

CORROSION MEASURING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ELHS)

USE AND INSTALLATION

This category covers corrosion measuring equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of corrosion measuring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations," UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Corrosion Measuring Equipment for Use in Hazardous Locations" or "Corrosion Measuring Equipment (Associated Apparatus)" or other appropriate product name as shown in the individual Listings.

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DATA PROCESSING EQUIPMENT, ELECTRONIC FOR USE IN HAZARDOUS LOCATIONS (ENWS)

This category covers individual units and systems primarily electronic in function and design, which are intended to accumulate, process, or store data and which are intended for use in or have circuits or system units intended for use in areas classified as hazardous locations.

Many of these units and systems require special installation such as separate transformer and branch circuit power, power supplies, special grounding methods, high frequency motor generator equipment, etc. Such features are covered in the manufacturer's installation instructions.

Intrinsically safe equipment is so marked on the product.

To maintain the intrinsically safe features of battery operated appliances, only batteries of the type and size indicated on the product should be used.

The basic standards used to investigate products in this category are UL508, "Industrial Control Equipment"; UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations"; UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations"; and UL1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, and Class III, Divisions 1 and 2", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Data Processing Equipment for Use in Hazardous Locations", "Electronic Data Processing Equipment for Use in Hazardous Locations", "E.D.P. Equipment for Use in Hazardous Locations", "Data Processing Equipment with Circuits for Use in Hazardous Locations", "Electronic Data Processing Equipment with Circuits for Use in Hazardous Locations", "Electronic Data Processing Equipment for Use in Hazardous Locations", "E.D.P. Equipment with Circuits for Use in Hazardous Locations", "Data Processing Equipment (Associated Apparatus)", "Electronic Data Processing Equipment (Associated Apparatus)", "E.D.P. Equipment (Associated Apparatus)", or the name of the specific type of product as shown in the individual Listing.

DOOR OPERATORS FOR USE IN HAZARDOUS LOCATIONS (FCQU)

This category covers door operators for fire doors intended for installation in accordance with the recommendations contained in the National Fire Protection Association Standard for Fire Doors and Windows, NFPA No. 80.

They are intended for single-slide and center parting level and inclined-track fire doors. These devices consist of an electric-powered operator which opens and closes the door during normal usage and a mechanical release which, under fire conditions, disconnects the door from the powered operator and permits it to close by either a listed sliding-door closer or a system of suspended weights.

The basic standards used to investigate products in this category are UL 325, "Door, Drapery, Gate, Louver, and Window Operators and Systems"; UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations"; UL 1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, Class III, Division 1 and 2"; UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name: "Door Operator for Use in Hazardous Locations".

DOOR HOLDERS FOR USE IN HAZARDOUS LOCATIONS (FDGF)

This category covers door holders for fire doors intended for installation in accordance with the recommendations contained in NFPA 80, "Standard for Fire Doors and Windows."

They are intended for use with swinging, sliding or rolling fire doors, as indicated in the individual listings, and are designed to hold doors in the

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open position under normal usage and release the doors under fire conditions. They are intended to be used with a suitable door closer and automatic operating devices or systems.

Automatic operating devices or systems consist of Releasing Devices of Heat Detectors For Releasing Device Service, as Listed in the Hazardous Location Equipment Directory. For information on door closers, see Fire Door Accessories (GVUW) and Door Closers, Holders and Operators (GTBT) in the Fire Resistance Directory, Volume 3.

It will be necessary for prospective users of these holders to first ascertain from the Authorities Having Jurisdiction that the door, door holders, door closer and automatic operating device or other combination of system units are acceptable for any given location.

REQUIREMENTS

The basic standards used to investigate products in this category are UL 228, "Door Closers, Holders, and Integral Smoke Detectors" UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, Class III, Divisions 1 and 2," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Door Holder for Use in Hazardous Locations."

DRILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FDJZ)

These Listings cover products specifically intended for installation on oil rigs and drilling platforms.

DRILLING INSTRUMENTATION FOR USE IN HAZARDOUS LOCATIONS (FDKX)

This category includes drilling equipment consisting of instruments, sensors and transducers intended to measure record and monitor drilling variables and to control the drilling process.

Investigations of these products included an evaluation for potential conformity to the installation and use provisions of the National Electrical Code (NEC) or United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive).

Intrinsically safe circuits and equipment shall be installed and interconnected in accordance with the instructions provided. For additional information, see Equipment for Hazardous Locations, Guide AAIZ.

The basic standards used to investigate products in this category are UL1092, "Process Control Equipment"; UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations"; UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations"; and UL1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, and Class III, Divisions 1 and 2," as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Drilling Instrumentation for Hazardous Locations", "Drilling Instrumentation (Associated Apparatus)" or other appropriate product name as shown in the individual Listing.

MARINE SHIPBOARD CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (FDLW)

This category covers combination termination and sealing fittings for threaded connection of marine shipboard cable to equipment in hazardous locations. They are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are to be made in the fitting. Restrictions on application, position, and/or location of the sealing fitting are indicated in the manufacturer's instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings included an evaluation for conformity to the installation and use provisions of Sub-part 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive) as applied by the authority having jurisdiction.

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The basic Standard used to investigate products in this category is UL 2225 "Metal-Clad Cables and Cable Sealing Fittings For Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: "Marine Shipboard Cable Sealing Fitting For Use In Hazardous Locations."

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FNTR)

BALLASTS FOR USE IN HAZARDOUS LOCATIONS (FOGZ)

USE

This category covers alternating current ballasts for high intensity discharge lamps. The power factor indicated can be considered as the approximate power factor under normal operating conditions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ballast for Use in Hazardous Locations."

ELECTROMAGNETS FOR USE IN HAZARDOUS LOCATIONS (FOOM)

Products in this category are electromagnets, including electromagnetic separators, used to generate magnetic fields. Special care should be taken to ensure suspended electromagnets are installed in accordance with manufacturer's instructions, and that they are suspended from beams or cables with adequate strength. Some types of electromagnetic separators use moving belts to move items out of the magnetic field. Special care should be taken to ensure that these products are installed in accordance with manufacturer's instructions, and that guarding is provided on moving parts in accordance with local codes.

This category does not cover electromagnetic interference filters used to attenuate unwanted radio frequency signals. Such products are Listed in the Electrical Appliance and Utilization Equipment Directory.

The basic standards used to investigate products in this category are UL 1203, "Explosion-proof and Dust-ignition-proof Electrical Equipment for Use in Hazardous Locations," or UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations" as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and the product name: "Electromagnet for Use in Hazardous Locations", or other appropriate product name as shown in the individual product listing.

ELEVATOR APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (FRZV)

Devices listed under this category include Hoist way Door Interlocks, Hoistway-Door Combination Mechanical Locks and Electric Contracts, and Hoistway-Door or Car door or Gate Electric Contracts, and Miscellaneous Elevator Appliances, including Hoist way Limit Switches.

**ELEVATOR DOOR LOCKING DEVICES AND
CONTACTS FOR USE IN HAZARDOUS
LOCATIONS (FSNT)**

The devices listed under this category are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, and Escalators, ANSI/ASME A17.1.

Elevator hoist way door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoist way door is locked in the closed position, and to prevent the opening of the hoist way door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

For interlocks that do not require the use of retiring cam, see Listing Mark A.

For interlocks that require the use of a retiring cam, see Listing Mark B.

Retiring cams are not covered by these listings, and their acceptability must be determined at the point of installation by the authority having jurisdiction.

Elevator hoist way door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoist way door is in the closed position, and to lock the hoist way door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone. See Listing Mark C.

Elevator hoist way door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position. See Listing Mark D.

The devices covered by these listings are investigated for misalignment conditions when properly installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the authority having jurisdiction.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: (A) "Elevator Interlock For Hazardous Locations", (B) "Elevator Interlock For Hazardous Locations - Retiring Cam Required", (C) "Elevator Combination Mechanical Lock and Electric Contact For Hazardous Locations", (D) "Elevator Electric Contact For Hazardous Locations".

**EMERGENCY LIGHTING EQUIPMENT
FOR USE IN HAZARDOUS
LOCATIONS (FTEV)****USE**

This category covers automatic transfer switches designed for control of emergency lighting and power circuits in hazardous locations as required by Articles 500 - 503 and 700 of NFPA 70, "National Electrical Code." The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers unit equipment, but not separate lamp heads or lighting fixtures.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 924, "Emergency Lighting and Power Equipment" and UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Emergency Lighting Equipment for Use in Hazardous Locations."

**EMERGENCY LIGHTING EQUIPMENT
FITTINGS FOR USE IN HAZARDOUS
LOCATIONS (FTGT)**

Subassemblies of emergency lighting equipment fittings intended for final assembly into a unit in the field in accordance with the manufacturer's installation instructions are included under this category.

Information restricting the use of these fittings is marked on the fitting or provided with the fitting.

The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations" and Articles 500-503 and 700 of the National Electrical Code.

The lighting circuit ratings do not exceed 250 volts for tungsten lamps.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Emergency Lighting Equipment, Fittings, for use in Hazardous Locations", or other appropriate product name as shown in the individual Listing.

**ENCLOSURES FOR METERING
EQUIPMENT FOR USE IN
HAZARDOUS LOCATIONS (FTRQ)**

These enclosures are intended to house low temperature metering equipment with no normally arcing or sparking parts in the hazardous location classes and groups indicated on the product, and defined in the National Electrical Code.

The basic standard used to investigate products in this category is UL886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosure for Metering Equipment For Use In Hazardous Locations".

**ENCLOSURES FOR USE IN
HAZARDOUS LOCATIONS (FTRV)****GENERAL**

This category covers enclosures for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with NFPA 70, "National Electrical Code": Class I, Groups A, B, C and D; Class II, Groups E, F and G; and Class III, Groups F and G, Division 2 only. Classification covers the enclosure only.

Unless otherwise noted in the individual Classifications, enclosures are evaluated for enclosing electrical equipment intended for connection to circuits having a maximum available fault current of 10,000 rms symmetrical amperes.

RELATED PRODUCTS

Certain enclosures Classified under this category have also been investigated for use aboard marine vessels in accordance with the Electrical Engineering Regulations of the United States Coast Guard, Subchapter J, CG-259 (46CFR Parts 110-113). Such enclosures are identified by a Marine Listing Mark. Enclosures marked "For Use On Vessels Over 65 Feet" have not been subjected to shock and vibration tests. Enclosures that have been subjected to shock and vibration tests are not marked with a vessel length limitation and may be used on any size vessel.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate explosion-proof and dust-ignition-proof enclosures in this category is UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations."

The basic standard used to investigate dusttight enclosures for Class II, Groups F and G, Division 2 is UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations."

Subject 2062, "Outline of Investigation for Enclosures for Use in Hazardous (Classified) Locations" is also used to investigate explosion-proof, dust-ignition-proof and dusttight enclosures.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

**ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS
AS TO EXPLOSION AND FIRE HAZARD ONLY
(Control No.)**

ENCLOSURE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (FTRX)

Enclosure bodies, flat, domed or window covers, threaded extensions, actuation mechanisms and similar subassemblies of enclosures are included in this category. They are intended to be assembled at the factory or in the field to form a complete explosion-proof or dust-ignition proof enclosure. Restrictions on the use and assembly of these devices are marked on each part.

For additional information, see Enclosures (FTRV).

The basic standard used to investigate products in this category is UL 1203, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking for these products consists of the statement below in quotation marks, and a control number.

**"CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
AS TO EXPLOSION AND FIRE HAZARD ONLY.**

ENCLOSURE ACCESSORY FOR USE IN HAZARDOUS LOCATIONS"

EXIT SIGNS AND EXIT APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (FWBC)

This category covers exit signs and exit appliances as identified by the following specific product categories.

The installation and use of these devices are specified in NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures."

These products have not been investigated with reference to fire resistance. Related devices that have been evaluated for fire resistance are covered in the Fire Resistance Directory.

SELF-LUMINOUS EXIT SIGNS AND MARKERS FOR USE IN HAZARDOUS LOCATIONS (FWBH)

This category covers exit signs and markers that are continuously illuminated internally by self-contained energy sources and operate independent of external power supplies. They are intended for installation in accordance with ANSI/NFPA 101, "Life Safety Code" and other codes governing the marking of the means of egress.

Signs and markers that utilize a radioactive source comply with the requirements of the United States Nuclear Regulatory Commission for Generally Licensed Devices.

Exit signs that do not comply with the visibility requirements from 100 ft are marked with a maximum viewing distance of 50 or 75 ft, and are intended only for installation in corridors or rooms where the distance to the exit sign cannot exceed the marked maximum distance.

Exit signs whose visibility is dependent on external illumination (such as photoluminescent signs) are intended for installation only where such external illumination is deemed reliable and sufficient by the Authority Having Jurisdiction. Where compliance with the visibility requirements demands external illumination greater than 1 ft-cd, these signs are marked, where visible after installation, for a minimum 5 ft-cd illumination intensity, measured on the face of the sign.

Exit signs whose visibility is expected to decline over time (such as those containing self-luminous gases) are marked, where visible after installation, with a replacement date.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self-luminous Exit Sign (Marker)."

FANS, PORTABLE ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (GQJA)

This category covers portable electric fans for use in Groups C and/or D under Class I hazardous locations as indicated in the respective Listings.

Motors are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having a grounding conductor.

Connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, Listed for the specified hazardous locations. The flexible cord connected to the units should be frequently examined and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities having jurisdiction should be consulted with regard to conditions under which this portable equipment will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Portable Electric Fan For Hazardous Locations".

FANS, PORTABLE PNEUMATIC FOR USE IN HAZARDOUS LOCATIONS (GQJX)

This category covers portable pneumatic fans for use in Class I, Groups A, B, C, and D; Class II, Groups E, F, and G; and Class III hazardous locations as indicated in the respective Listings. The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Hazardous Locations." Air supply lines shall be made of electrically conductive material in accordance with the Recommended Practice on Static Electricity, NFPA 77, and/or any other applicable code. Ground terminal connections need to be properly made and maintained.

Authorities having jurisdiction should be consulted with regard to conditions under which this portable equipment will be permitted for use. Portable equipment should be used only where necessary.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Portable Pneumatic Fan For Hazardous Locations" or other appropriate product name as shown in the individual Listing.

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

LUMINAIRES FOR USE IN HAZARDOUS LOCATIONS (IFUX) USE AND INSTALLATION

This category covers incandescent lamp, fluorescent lamp, high intensity discharge lamp, or surgical type luminaires for use in hospital operating rooms, and luminaires for use with germicidal lamps.

Seals are provided in the luminaires for Class I, Division 1 hazardous locations between lamp chambers and wiring chambers for supply line connections. The luminaires have been tested with respect to safe maximum external temperatures.

Luminaires Listed for use in any of the groups under Class II, Division 1 and 2 hazardous locations have been tested for dusttightness and safe operation in the presence of the specific combustible dusts. The equipment should be kept clean and should be carefully maintained so as not to allow combustible dust to accumulate on equipment or in buildings. The operating temperature of any parts which may be in contact with the combustible dust is marked on the luminaire if this temperature exceeds 100°C.

Luminaires for Class I, Division 2 only, of no specific hazardous location groups or of one or more of the hazardous location groups are included below. Such Listings are under hazardous location group headings with the suffix "Division 2 only" or under the heading "Class I, Division 2 only."

Luminaires without guards should be used only where not subject to breakage.

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Luminaires intended for use with germicidal lamps are marked with a caution notice regarding their installation so that users will not be subjected to injurious radiations.

Luminaires suitable for locations having deposits of readily combustible paint residue are so marked.

Luminaires requiring supply wiring with certain temperature ratings are so marked.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electric Lighting Fixture for Hazardous Locations," "Electric Fixture for Hazardous Locations," "Electric Luminaire for Hazardous Locations" or "Luminaire for Hazardous Locations."

LUMINAIRES, PAINT SPRAY BOOTH FOR USE IN HAZARDOUS LOCATIONS (IFYJ)

USE AND INSTALLATION

This category covers incandescent lamp and electric discharge lamp type luminaires intended for flush-mounted installation in the ceiling or wall of a down draft paint spray booth using liquid coating systems as defined in NFPA 33, "Standard for Spray Application Using Flammable or Combustible Materials." When the luminaire is limited to a specific mounting location, the luminaire is marked with the intended mounting location, such as "For Wall Mounting Only" or "For Ceiling Mounting Only." When the luminaire is intended for wall and ceiling mounting, the luminaire is not marked with its intended mounting location.

These luminaires have been evaluated for deposits of readily combustible paint residues only on the side of the luminaire that forms the interior ceiling or wall surface of the spray booth.

These luminaires have been evaluated for Class I, Division 2 areas since they may be located within 3 ft of an opening in the paint spray booth and are so marked.

These luminaires are intended to be installed in uninsulated or insulated single or double skin sheet metal ceilings or walls with all insulation kept a min distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire.

The minimum spacings between adjacent luminaires, to side walls, to the ceiling above the luminaire, and to the floor below the luminaire are outlined in the installation instructions provided with each luminaire. The space between the flush-mounted luminaire and the adjacent ceiling, floor or walls of the building which are located behind the luminaire must contain relatively unobstructed air space around the luminaire equal to the marked spacings. No allowance has been made for any heat contributed by external heat sources such as steam pipes, heating ducts, and the like.

These luminaires may be accessed for relamping and servicing from either (1) the interior or (2) the exterior of the paint spray booth. If the luminaire is intended to be accessed from the interior of the paint spray booth and is wall mounted, a door or frame interlock switch is provided. This switch is intended to be connected to the control circuit of the spray booth such that if the luminaire door or frame is not closed properly, painting operations cannot be conducted. A ceiling-mounted luminaire that is intended to be accessed from the interior of the spray booth is also provided with a door or frame interlock switch or is marked "Caution — Do Not Operate Paint Spray Booth When Luminaire Frames Are Open. Keep Luminaire Frame Tightly Closed While Paint Spray Booth Is Operating."

Each luminaire is marked with the rated ambient temperature. A luminaire may be marked with two ambient temperatures, indicating that the luminaire has been evaluated for a higher ambient on the lens side, for example "Ambient 60 C Front, 25 C Rear." If the marked ambient for the lens side is less than the ambient temperature within the spray booth during the baking mode, the luminaire shall be connected to the control circuit of the spray booth such that the luminaire is de-energized during the baking mode. Independent of the marked ambient temperature, installation instructions provided with each luminaire specify the maximum ambient temperature for the luminaire. For example, the luminaire may be marked 25°C ambient and the installation instructions specify maximum installation ambient of 60°C. Consequently, (1) the luminaire is to be de-energized during the baking mode and (2) the maximum ambient temperature within the spray booth during the baking mode is 60°C.

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Unless the luminaire is marked "Maximum of ____ No. ____ AWG branch circuit conductors suitable for at least ____ C (____ F) permitted in junction box," no allowance has been made for any heat contributed by branch circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaire.

Luminaires that include raceways are marked, in combination with the Listing Mark, "Suitable for use as Raceways" and are marked to indicate the maximum number, size and type conductors they intend to accommodate.

Each luminaire is provided with installation and maintenance instructions. The maintenance instructions outline procedures to be followed for lens cleaning and gasket replacement. Cleaning and servicing of the luminaires must be performed only when the interior of the spray booth is nonhazardous and only when the ventilation system is operating.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Paint Spray Booth Lighting Fixture for Hazardous Locations" or "Paint Spray Booth Luminaire for Hazardous Locations."

LUMINAIRES, RECESSED TYPE FOR USE IN HAZARDOUS LOCATIONS (IGBW)

USE AND INSTALLATION

This category covers incandescent lamp and electric discharge lamp type luminaires intended for recessed installation in walls and ceilings of hazardous locations in accordance with the provisions of NFPA 70, "National Electrical Code." Unless marked "Suitable for damp locations" or "Suitable for wet locations," recessed luminaires are only suitable for dry locations.

Recessed luminaires are marked with the required minimum temperature rating of wiring supplying the luminaire. Unless marked "maximum of ____ No. ____ AWG branch circuit conductors suitable for at least ____ C (____ F) permitted in junction box," no allowance has been made for any heat contributed by branch circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaire. The operating temperature is marked on the luminaire if this temperature exceeds 100°C.

Recessed luminaires Listed for any of the groups under Class I, Divisions 1 and 2 hazardous locations are designed to operate without causing ignition of surrounding flammable gas or vapor-air atmosphere covered by the group under which it is Listed. Seals are provided in luminaires for Class I, Division 1 hazardous locations between lamp chambers and wiring chambers for supply line connections. The luminaires have been tested with respect to maximum external operating temperatures.

Recessed fluorescent luminaires which include raceways are marked, in combination with the Listing Mark, "Suitable for use as Raceways" and are marked to indicate the maximum number, size, and type conductors they are intended to accommodate.

Recessed luminaires suitable for such use may be marked "Suitable for installation in poured concrete" except that recessed luminaires suitable only for installation in poured concrete are marked "For installation only in poured concrete."

Recessed luminaires known to produce temperatures in excess of 90°C at a distance of 1/2 in. from the enclosure walls, and which therefore are only suitable for installation in fire resistive constructions are marked "This luminaire is suitable for installation only in buildings of fire resistive construction, where the luminaire is not mounted on or adjacent to combustible material."

Listings of recessed luminaires for Class I, Division 2 only, of no specific hazardous location groups or of one or more of the hazardous location groups are included below. Such Listings are under hazardous location group headings with the suffix "Division 2 only" or under the heading "Class I, Division 2 only." The luminaire should not be installed in any location where the ignition temperature of the gas of vapor-air mixture which may be present is less than the operating temperature marked on the luminaire.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

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The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Recessed Type Electric Lighting Fixture for Hazardous Locations," "Recessed Type Electric Fixture for Hazardous Locations," "Recessed Type Electric Luminaire for Hazardous Locations" or "Recessed Type Luminaire for Hazardous Locations."

**LUMINAIRE FITTINGS FOR USE IN
HAZARDOUS LOCATIONS (IGIV)**

USE

This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

Also included are conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for support of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations" and UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fixture Fitting for Hazardous Locations," "Luminaire Fitting for Hazardous Locations," "Electric Lighting Fixture for Hazardous Locations When Completely Assembled With UL Listed Fixture Fittings for Hazardous Locations" or "Luminaire for Hazardous Locations When Completely Assembled With UL Listed Luminaire Fittings for Hazardous Locations."

**LUMINAIRE FITTINGS FOR USE WITH
SPECIFIED FITTINGS FOR USE IN
HAZARDOUS LOCATIONS (IGMX)**

USE

This category covers luminaire fittings intended for field installation only with specified compatible Listed luminaire fittings (see IGIV) to form complete luminaires as identified on the product.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information: "LUMINAIRE (OR FIXTURE) FITTING FOR HAZARDOUS LOCATIONS FOR USE WITH LISTED LUMINAIRE (OR FIXTURE) FITTINGS SPECIFIED IN MARKINGS IN OR ON THE PRODUCT."

**LIGHTING UNIT FITTINGS, AUXILIARY FOR
USE IN HAZARDOUS LOCATIONS (IGOY)**

USE AND INSTALLATION

This category covers subassemblies of lighting units, battery packs, charging sections and control devices intended for final assembly into battery powered auxiliary lighting units in the field.

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This unit equipment is intended to provide auxiliary light from included light sources only, when the normal power supply to the equipment is disconnected or otherwise interrupted.

The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer devices includes the determination of their suitability for the auxiliary supply circuit. Information or instructions are provided specifying the subassemblies that may be used to assemble an auxiliary lighting unit in the field.

The unit equipment has not been investigated to determine its conformity with Article 700 of NFPA 70, "National Electrical Code" covering emergency lighting.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations" and applicable sections of UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Auxiliary Lighting Unit Fitting for Use in Hazardous Locations," "Auxiliary Lighting Unit When Completely Assembled With UL Listed Luminaire (or Fixture) Fittings for Hazardous Locations" or "Auxiliary Lighting Unit When Completely Assembled With UL Listed Auxiliary Lighting Unit Fittings for Hazardous Locations."

**FLASHLIGHTS AND LANTERNS FOR
USE IN HAZARDOUS LOCATIONS
(IKBR)**

Flashlights and lanterns Listed for any of the groups under Class I hazardous locations have been tested with respect to use in the presence of specific flammable gas or vapor-air atmospheres. Those Listed for any of the groups under Class II hazardous locations have been tested with respect to use in the presence of specific combustible dusts. The tests have been conducted using specific lamp and battery combinations. The lamp designation and the number, type, size and voltage of the batteries to be used are marked on the product.

The products covered by these Listings are provided with a filament disconnect mechanism or other type of construction to protect against ignition of the specified hazardous atmosphere. The filament disconnect mechanism is intended to disconnect the lamp bulb from the circuit when the glass bulb or envelope surrounding the lamp filament is broken.

Safety of operation in the presence of explosive mixtures may be endangered if replacement parts other than those specified on the product are used.

Flashlights and lanterns are not permitted to be used in hospital operating rooms unless so marked on the device.

Hand Lanterns

The basic standard used to investigate products in this category is UL783, "Electric Flashlights and Lanterns for Use in Hazardous Locations, Class I, Groups C and D".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Flashlight for Use in Hazardous Locations" or "Lantern for Use in Hazardous Locations".

**FLOOR CLEANERS FOR USE IN
HAZARDOUS LOCATIONS (ILQV)**

The products covered in the following section are floor cleaners consisting of an aqueous solution of detergents and certain other materials.

They have been Classified as to use on electrically conductive floorings Listed by Underwriters Laboratories Inc.

The use of these floor cleaners on Listed floorings does not adversely affect their electrical conductivity or their ability to dissipate electrostatic charges on persons and conductive equipment electrically contacting them.

The manufacturer's instructions for use of these floor cleaners should be followed.

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These floor cleaners are free from any tendency to heat spontaneously under conditions met with in practice.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®
AS TO ELECTRICAL CONDUCTIVITY WHEN USED ON CON-
DUCTIVE FLOORS AND SPONTANEOUS HEATING.

*

FOR USE WITH LISTED ELECTRICALLY CONDUCTIVE
FLOORING OF THE ** TYPE.

*Trade name.

**Type of flooring such as vinyl and/or linoleum.

FLOORING, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (INFZ)

The products covered in the following listings are electrically conductive floorings intended for use in industrial plants, arsenals, hospital operating rooms, and similar locations where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that these floorings, when installed and maintained in accordance with the manufacturers' instructions, are moderately electrically conductive and dissipate electrostatic charges on persons and conductive equipment making electrical contact with the floorings, and that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA No. 99.

Conductive footwear on personnel, and conductive equipment fitted with conductive bases, leg tips, or casters making electrical contact with the flooring are required in order to make conductivity of the flooring effective in equalizing electrostatic charges. A grounding connection to the flooring may be provided.

To dissipate static electrical charges which may be present on persons or movable equipment before entering the hazardous area, these floorings should extend into rooms and corridors immediately serving or communicating with the hazardous area.

Insulating floor waxes should not be used on these floorings.

When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.

The basic standard used to investigate products in this category is UL779, "Electrically Conductive Floorings".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product names as appropriate: "Electrically Conductive Flooring Relating to Hazardous Locations", "Electrically Conductive Floor Material Relating to Hazardous Locations" or "Floor Tile Relating to Hazardous Locations".

FLOORING, STATIC DISSIPATIVE, RELATING TO HAZARDOUS LOCATIONS (INTX)

The products covered in the following Classification are static dissipative flooring intended for use where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that these floorings, when installed and maintained in accordance with the manufacturers instructions dissipate electrostatic charges and the surface resistivity conforms to the requirements of The Department of Defense Military Handbook No. 263A, Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assembly and Equipment, Dated February 22, 1991.

Insulating floor waxes should not be used on these floorings.

When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.

The basic document used to investigate products in this category is the Department of Defense Military Handbook No. 263A.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

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The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

Static Dissipative Flooring Classified by Underwriters Laboratories Inc., DOD MIL-HDBK-263A. See instructions.

FOOTWEAR, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (IQKX)

The products covered by these listings are electrically conductive shoes, reusable slippers, and shoe covers for single use only, intended to be worn in hospital operating rooms and other locations where it is necessary for safety to avoid the accumulation of static electricity on personnel.

Products intended for single use only are so identified on the product.

Due to the electrical conductivity of this footwear, they are capable of readily removing static electrical charges from wearers standing on conductive floors. The electrical resistance conforms to the requirements of Chapter 3 of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA No. 99.

Conductive floors are required for the proper dissipation of static electrical charges by this footwear. To determine that the conductivity of the footwear has not been impaired by contamination with insulating waxes, or from other accidental causes, the electrical resistance of the footwear should be measured each time they are worn, as described in NFPA No. 99 referred to above. Hosiery of silk and wool should be avoided. Foot powders should not be used because of their drying and insulating properties.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

Footwear, Electrically Conductive-Bootie, Electric
Footwear, Electrically Conductive-Conductive Shoes
Refer to listings of Electrically Conductive Floorings.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product names as appropriate: "Electrically Conductive Footwear", "Electrically Conductive Shoe" or "Shoe Cover Relating to Hazardous Locations".

FUMIGANT DISPENSING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (IYNK)

This category includes equipment for dispensing fumigant pellets.

Equipment in this category consists of an assembly of UL Listed, Classified and Recognized parts. The basic standards used to investigate products in this category are the applicable standards for the parts of the assembly.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Fumigant Dispensing Equipment for Hazardous Locations", "Fumigant Dispenser for Hazardous Locations" or other appropriate product name as shown in the individual Listing.

GAS OR VAPOR DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (JTNQ)

GAS OR VAPOR DETECTION EQUIPMENT ENCLOSURES FOR USE IN HAZARDOUS LOCATIONS (JTOL)

These enclosures are for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with the

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National Electrical Code: Class I, Groups A, B, C and D; Class II, Groups E, F and G. Classification covers the enclosure only.

The basic standard used to investigate products in this category is UL 1203, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment For Use in Hazardous Locations.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking consists of the UL Mark together with the word "CLASSIFIED" (as illustrated in the introduction of this Directory), the following statement and a control number.

**As to explosion and fire hazard only.
Enclosures for use in Hazardous Locations.**

**GAS OR VAPOR DETECTION EQUIPMENT
CLASSIFIED FOR USE IN HAZARDOUS
LOCATIONS (JTPD)**

These products are gas or vapor detectors and associated equipment for detecting specific gases or vapors, that may be present in the atmosphere incidental to operations or from accidental release and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with the National Electrical Code, or (3) intended for installation in panel assemblies in accordance with the instructions provided.

Gas or Vapor Detectors in this category have been evaluated for risk of explosion, fire and electric shock only.

The basic standards used to investigate products in this category are UL508, "Industrial Control Equipment", UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations", UL1203, "Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. as appropriate (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

The Classification Marking consists of the UL Mark together with the word "CLASSIFIED" (as illustrated in the introduction of this Directory), the following statement and a control number.

**ONLY AS TO INTRINSIC SAFETY
FOR USE IN HAZARDOUS LOCATIONS
or
AS TO FIRE, ELECTRICAL SHOCK
AND EXPLOSION HAZARDS ONLY**

**GAS OR VAPOR DETECTION EQUIPMENT
LISTED FOR USE IN HAZARDOUS
LOCATIONS (JTPX)**

These products are gas or vapor detectors and associated equipment for detecting specific gases or vapors, that may be present in the atmosphere incidental to operations or from accidental release and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with the National Electrical Code, or (3) intended for installation in panel assemblies in accordance with the instructions provided.

Gas or vapor detectors listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation of the instrument in the presence of flammable and explosive mixtures of representative gases and vapors with air. The flame arresters provided in the intake and suction lines of these instruments have been tested in the presence of flammable and explosive mixtures representative of the gases or vapors that the instruments are designed to detect and of the hazardous locations for which the detector has been Listed. Associated equipment may not necessarily be suitable for use in hazardous locations.

These instruments, when installed, maintained, and operated in compliance with the manufacturer's instructions, indicate percent of concentration or percent of the lower flammable limits of the specific gases or vapors. In some cases, meter readings must be interpreted in accordance with calibration data furnished by the manufacturer.

Gas or vapor detectors should be calibrated and inspected by the operator in compliance with the manufacturer's instructions, as performance of the instruments will depend on proper maintenance. The instruments should be calibrated with known gas- or vapor-air mixtures at intervals, and particularly after replaceable sensors incorporated in the detecting unit are replaced. Certain gases or vapors may adversely affect (poison)

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the sensors, and the use of the instruments in sampling atmospheres containing gases or vapors for which they have not been previously calibrated should, therefore, be avoided.

Minor variations in the flow of sample aspirated to the detecting unit do not affect the operation of these instruments to any great extent. However, as the instruments become inoperative in the event of clogging of sampling lines, flame arresters, or filters, precautions should be taken to keep these components clean and free from obstructions. Where condensation of vapors occurs in the detecting unit, or in the sampling lines and fittings, erroneously low indications by the instrument may result. Absorption of appreciable amounts of certain gases or vapors by nonmetallic tubing used as sampling lines may also result in incorrect indications by the instrument.

The basic standards used to investigate products in this category are UL508, "Industrial Control Equipment", UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations", UL 1203, "Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations" and ISA S12.13, "Performance Requirements, Combustible Gas Detectors".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "(Combustible) Gas Detector for Hazardous Locations" or "(Combustible) Vapor Detector for Hazardous Locations", or other appropriate product name as shown in the individual listing. The word "Combustible" in the product name is optional.

**GROUND-FAULT CIRCUIT
INTERRUPTERS FOR USE IN
HAZARDOUS LOCATIONS (KCYN)**

This category covers ground-fault circuit interrupters for use in accordance with the National Electrical Code, ANSI 1/NFPA 70. These devices are mounted in explosion-proof and/or dust-ignition-proof enclosures.

A ground-fault circuit interrupter is a device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some pre-determined value that is less than that required to operate the overcurrent protective device of the circuit.

A ground-fault circuit interrupter is intended to be used only in a circuit where one of the conductors is solidly grounded.

A Class A ground-fault circuit interrupter trips when the current to ground has a value in the range of 4 through 6 milliamperes. A Class A ground-fault circuit interrupter is suitable for use in branch and feeder circuits.

The "TEST" and "RESET" buttons on the GFCIs are only intended to check for the proper functioning of the GFCI. They are not intended to be used as "ON" and "OFF" controls of motors or other loads unless the buttons are specifically marked "ON" and "OFF".

The basic standards used to investigate products in this category are UL943, "Ground-Fault Circuit Interrupters" and UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Ground Fault Circuit Interrupter for Use in Hazardous Locations", or "Ground-Fault Interrupter for Use in Hazardous Locations" or other appropriate product name as indicated in the individual Listing.

**HEATERS FOR USE IN HAZARDOUS
LOCATIONS (KFHT)**

**HEATERS, AIR FOR USE IN HAZARDOUS
LOCATIONS (KFVR)**

These listings include air heaters of the natural convection, radiant heating, and fan assisted types. Heaters for surface mounting should be installed in a horizontal position and should not be recessed, obstructed, or placed on or under shelves. Installation should be in accordance with instructions furnished with the heater.

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The basic standard used to investigate products in this category is UL823, "Electric Heaters for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Heater For Hazardous Location".

Accessories, Air Heater (KGCI)

This category covers accessories intended to be used in conjunction with the individual manufacturer's Listed air heaters for use in hazardous locations. Accessories include temperature regulating components.

The basic standard used to investigate products in this category is UL 823, "Electric Heaters for use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Heater Accessory for Use in Hazardous Locations."

ELECTRICAL RESISTANCE HEAT TRACING CABLE SETS FOR USE IN HAZARDOUS LOCATIONS (KGFR)

USE

This category covers heat tracing cables intended for pipe line or vessel heat tracing.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Tracing Cable Set for Use in Hazardous Locations" or "Heat Tracing Cable System for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

HEATERS, INDUSTRIAL AND LABORATORY FOR USE IN HAZARDOUS LOCATIONS (KGIZ)

This category covers paint heaters, ovens, hot plates, and other types of heaters as described in the individual Listings.

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary instructions are marked on the equipment.

The basic standard used to investigate products in this category is UL 823, "Electric Heaters for Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "Listed," a control number, and one of the following product names: "Industrial and Laboratory Heater for Use in Hazardous Locations," "Industrial Heater for Use in Hazardous Locations," "Laboratory Heater for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

HEATERS, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (KGWX)

Included in this category are:

This category covers miscellaneous heaters, including immersion heaters, motor enclosure space heaters, and heaters for compressed air and water hose reels.

The basic standard used to investigate products in this category is UL823, "Electric Heaters for Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products

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includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heater for Use in Hazardous Locations" or other appropriate product name.

WATER DRIVEN VENTILATORS FOR USE IN HAZARDOUS LOCATIONS (NCGV)

This category covers water turbine powered, positive pressure ventilators intended for use in hazardous locations.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: "Positive Pressure Ventilation Fan for Use in Hazardous Locations", "Water Driven Ventilators for Use in Hazardous Locations", or other appropriate product name as shown in the individual Listing.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

Industrial control equipment marked "Rain tight" is subjected to a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

If the sealed rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

CONTROL PANELS AND ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (NNNY)

USE AND INSTALLATION

This category covers control panels and assemblies consisting of enclosures and electrical components such as push button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.

The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

It is intended that wiring between the electrical components of modular assemblies be field installed.

Lead wire seals are not required between the modular enclosures. However, conduit runs entering an assembly should be sealed in accordance with the requirements of NFPA 70, "National Electrical Code," unless factory made seals are provided and the product is marked to so indicate.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Receptacles with plugs included on Listed assemblies have been subjected to endurance and overload operation tests in the presence of the specific flammable atmospheres for Class I locations and while heavily blanketed with combustible dust for Class II locations.

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The plugs of the receptacle-plug combinations are for use with Type S, SO, ST or STO flexible cord with grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which those assemblies having receptacles with plugs will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Control Assembly Body for Hazardous Locations," "Control Assembly Cover for Hazardous Locations" or "Control Panel for Hazardous Locations."

Control Assembly Covers for Use in Hazardous Locations (NNRL) USE AND INSTALLATION

This category covers control assembly covers consisting of devices such as push button stations, pilot lights, snap switches, motor controllers or receptacles Classified for use only with specific models of Listed control assembly bodies or plugs for hazardous locations as specified in the installation instructions provided with the cover.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor. The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which plugs and receptacles will be permitted for use. It is recognized that portable equipment should be used only where necessary. Receptacles and plugs Listed for use in Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNNY), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

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LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

FOR USE WITH LISTED *

FOR HAZARDOUS LOCATIONS

SPECIFIED IN THE INSTALLATION INSTRUCTIONS PROVIDED WITH THE PRODUCT

* - "Control Assembly Bodies" or "Plugs" as appropriate

Flame Control Panels for Use in Hazardous Locations (NNTE)

GENERAL

This category covers flame control panels intended for application in the control of fossil fuel burning equipment such as incinerators, kilns and drying ovens. Flame control panels have been Classified only as to electrical fire and shock hazards. The compatibility of the panel with the controlled equipment from the standpoint of programming the burner(s) and preventing hazardous conditions due to firing of fuel has not been determined.

ADDITIONAL INFORMATION

For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNNY), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508A, "Industrial Control Panels," UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product name, and the statement: "AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY."

MOTOR CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NNUX)

Motor controllers are Listed under the following categories with maximum ratings of 200 hp and/or 300 amp and 600 V:

- Auxiliary Devices
- Combination Motor Controllers
- Float- and Pressure-Operated Motor Controllers
- Magnetic Motor Controllers
- Manual Motor Controllers
- Miscellaneous Motor Controllers

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings and at ten times motor full load running current for d-c horsepower ratings.

Auxiliary Devices for Use in Hazardous Locations (NOIV)

USE AND INSTALLATION

This category covers auxiliary devices intended for use in control circuits of magnetic motor controllers and the like, and consist of the following devices: machine operated switches, push button stations (including pilot lights and selector switches), miscellaneous manually operated switches, magnet operated switches and magnetically operated switches.

Auxiliary devices provided with a factory seal of conductors entering the pilot light or switch enclosure are so identified by a marking on the product.

Pilot lights without guards should be used only where not subject to breakage.

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Enclosures furnished without mechanisms are marked to identify the mechanisms that are to be used.

RECONDITIONED PRODUCTS

This category also covers auxiliary devices that have been reconditioned. Reconditioned auxiliary devices may also be referred to as rebuilt. Reconditioned auxiliary devices are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned auxiliary devices are subject to the same requirements as new auxiliary devices.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations" or "Industrial Control Equipment Enclosure (or Ind. Cont. Eq.) for Use in Hazardous Locations." For rebuilt products, the product name is preceded by either "Reconditioned" or "Rebuilt."

**Combination Motor Controllers for Use in
Hazardous Locations (NOTH)**

This Listing covers combination motor controllers.

Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

Combination motor controllers are marked "Combination Motor Controller" to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standard used to investigate products in this category is UL698, "Industrial Control Equipment For Use In Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) for use in Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations".

**Float- and Pressure-operated Motor Controllers
for Use in Hazardous Locations (NOWT)**

USE

This category covers float-operated switches and pressure-operated switches, including vacuum-operated switches. These devices are for direct control of motors, for use in control circuits of magnetic motor controllers and the like, and for control of other types of loads.

Unless otherwise indicated on the individual products, these devices are intended for use only with air, water, or other nonhazardous fluids.

Unless otherwise indicated on the individual products, these devices are for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature.

These devices have not been investigated for use in connection with automatic sprinkler or similar protective equipment.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous

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REQUIREMENTS

The basic standards used to investigate products in this category are UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations."

**Magnetic Motor Controllers for Use in
Hazardous Locations (NPKR)**

Magnetic Across-The-Line Starters are listed under this category.

Safety of operation of oil immersed type starters will be endangered should the oil level be below the minimum shown by indicator. These devices should be installed with a Listed sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Magnetic switches for controlling other than motor loads are Listed under Auxiliary Devices.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standard used to investigate products in this category is UL698, "Electric Industrial Control Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names:

"Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations", or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosures For Use In Hazardous Locations".

**Manual Motor Controllers for Use in Hazardous
Locations (NPXZ)**

Manual Across-The-Line Starters are covered in this category.

Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished.

The basic standard used to investigate products in this category is UL698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations".

**Miscellaneous Motor Controllers for Use in
Hazardous Locations (NQLX)**

USE

This category covers devices intended for direct control of motors.

Unless otherwise indicated on the individual products, these devices are for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature.

These devices have not been investigated for use in locations having automatic fire sprinklers.

RELATED PRODUCTS

Devices for use in control circuits of magnetic motor controllers and the like are covered under Auxiliary Devices (NOIV).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

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REQUIREMENTS

The basic standards used to investigate products in this category are UL 698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations."

Power Conversion Equipment for Use in Hazardous Locations (NQMD)

GENERAL

This category covers equipment that supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or Transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power Conversion Equipment may be of the open or enclosed type. This equipment is intended for use in Hazardous (Classified) Locations in accordance with Article 500 of ANSI/NFPA 70, "National Electrical Code."

Power conversion equipment incorporating overload protection for motors and not intended for remote or external motor overload protection are marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection, is marked to indicate motor protection such as thermal overload relays or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input and output electrical ratings.

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508C, "Power Conversion Equipment" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations".

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations" (or "Ind. Cont. Eq. for Use in Haz. Loc."), or "Power Conversion Equipment for Use in Hazardous Locations" or other appropriate product identity as indicated in the individual Listings.

MOTOR CONTROLLERS OVER 1500 V FOR USE IN HAZARDOUS LOCATIONS (NRAA)

This category covers enclosed motor controllers having AC voltage ratings in the ranges of 2.2 kV to 2.5 kV or 3.8 kV to 5.0 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

Equipment covered by this category has been investigated for use on three phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line-to-line open-circuit voltage, and a phase factor of 1.73×10^6 .

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

The basic standards used to investigate products in this category are UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations"; UL1604, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, and Class III, Division 1 and 2" and UL347 "High Voltage Industrial Control Equipment" as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "High Voltage Industrial Control Equipment for use in Hazardous Locations".

PROGRAMMABLE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NRAG)

This category covers programmable industrial control systems for use in Division 2 hazardous locations utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also includes power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This Listing also includes programmable controllers and their accessories which have been reconditioned. Reconditioned programmable controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

These products are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil fired appliances.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations" (or Ind. Cont. Eq. for Use in Haz. Loc.) or Industrial Control Equipment for Hazardous Locations (or Ind. Cont. Eq. for Haz. Loc.) or other appropriate Product name as indicated in the individual Listing. For reconditioned products the product name is preceded by "Reconditioned", "Rebuilt", "Remanufactured" or "Refurbished."

INDUSTRIAL CONTROL EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (NRAW)

INDUSTRIAL CONTROL PANELS RELATING TO HAZARDOUS LOCATIONS (NRBX)

GENERAL

This category covers industrial control panels relating to hazardous locations which are factory wired assemblies of industrial control equipment such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch circuit protective devices.

Industrial control panels relating to hazardous locations are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe (low energy) circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

For intrinsically safe circuits, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated equipment be installed and interconnected in accordance with the instructions provided. The intrinsically safe circuit wiring must be routed in a separate raceway or otherwise reliably segregated from all power and other circuit wiring to preclude excessive currents and voltages from being impressed on the intrinsically safe circuit, rendering it nonintrinsically safe.

The investigation of industrial control panels relating to hazardous locations does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

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Industrial control panels for general use and for metal working machine tools for use in unclassified (ordinary) locations are covered under Industrial Control Panels (NITW) in the Electrical Construction Equipment Directory.

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 508A, "Industrial Control Panels" and UL 698A, "Industrial Control Panels Relating to Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Industrial Control Panel Relating to Hazardous Locations" or "Enclosed Industrial Control Panel Relating to Hazardous Locations" and the statement: "With Intrinsically Safe Circuit Extensions."

MOTOR CONTROLLERS RELATING TO HAZARDOUS LOCATIONS (NRCY)

GENERAL

This category covers auxiliary devices and magnetic motor controllers.

These devices are for use in unclassified (ordinary) locations. They contain intrinsically safe circuits intended for extension into hazardous (classified) locations.

Motor controllers incorporating thermal cutouts, thermal relays or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motor with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

Auxiliary Devices Relating to Hazardous Locations (NRDZ)

Devices covered in this section are for use in control circuits of magnetic motor controllers and the like.

The basic standards used to investigate products in this category are UL508, "Industrial Control Equipment" and UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment Relating to Hazardous Locations".

Motor Controllers, Magnetic, Relating to Hazardous Locations (NRFQ)

The basic standards used to investigate products in this category are UL508, "Industrial Control Equipment" and UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment Relating to Hazardous Locations".

INTRINSICALLY SAFE EQUIPMENT AND SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (OERX)

This category covers products and systems which have been investigated as to intrinsic safety only, as it pertains to use in hazardous loca-

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tions. Included are intrinsically safe products, intrinsically safe systems, associated apparatus with intrinsically safe circuit extensions, and other arrangements involving intrinsic safety as identified in the individual descriptions.

The basic standard used to investigate products in this category is UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations."

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
ONLY AS TO INTRINSIC SAFETY
FOR USE IN HAZARDOUS LOCATIONS**

LABORATORY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OGNA)

This category covers laboratory equipment and accessories designed for technological activities involving:

- (a) The measurement of physical or chemical properties of materials.
- (b) The measurement, control, and/or display of the functional performance of a piece of equipment.
- (c) Qualitative or quantitative constituent analysis of substances.
- (d) Preparation of materials for further analysis or measurements.

These products have been investigated with respect to risk of fire, shock, and injury to persons. The accuracy of measured, analyzed, or prepared quantities has not been evaluated.

This category does not include laboratory equipment intended for patient contact.

INSTALLATION INSTRUCTIONS

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary instructions are marked on the equipment or provided in the instructions.

RELATED PRODUCTS

Other equipment that may be used in laboratories is covered under Heaters, Industrial and Laboratory for Use in Hazardous Locations (KGIZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic ordinary locations standards used to investigate products in this category are UL 1262, "Laboratory Equipment" and UL 3101-1, "Electrical Equipment for Laboratory Use; Part 1: General Requirements", as appropriate.

The basic hazardous locations standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word "LISTED," a control number, and the product name "Motor-Operated Laboratory Equipment for Use in Hazardous Locations" or "Laboratory Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

LAUNDRY BAGS RELATING TO HAZARDOUS LOCATIONS (OOTV)

These laundry bags are made of anti-static materials and are for single use only. They are intended for use in hospital operating rooms where it is necessary for safety to avoid the accumulation of static electricity.

Tests show that the electrical resistivity conforms to the requirements of the Standard of The National Fire Protection Association, for Health Care Facilities, NFPA No. 99 and that the laundry bags, when in contact with grounded objects will prevent accumulation of dangerous amounts of static electrical charges.

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Laundry Bag Relating to Hazardous Locations".

LEAK DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OPDH)

This category covers leak detection equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of leak detection systems.

Certain products in this category are associated apparatus and are intended for installation in nonhazardous locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations", and UL 1604, "Electrical Equipment for Use in Class I, II, Division 2 and Class III Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Leak Detection Equipment for Use in Hazardous Locations", "Leak Detection Equipment (Associated Apparatus)", or other appropriate product name as shown in the individual Listing.

MASKS, FACE AND REBREATHING BAGS, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (PGJZ)

These face masks, including head harness, and rebreathing bags made from electrically conductive natural or synthetic rubber are intended for use in flammable anesthetizing locations where accumulation of charges of static electricity presents a hazard due to the possibility of static sparks being formed in the presence of flammable anesthetic-air mixtures.

Tests indicate that these parts are sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Electrically Conductive Face Mask Relating to Hazardous Locations", "Electrically Conductive Head Harness Relating to Hazardous Locations" or "Electrically Conductive Rebreathing Bag Relating to Hazardous Locations".

MATTRESSES AND PADS, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (PHLV)

These mattresses and pads are provided with a sheet covering made of cotton material coated with an electrically conductive natural or synthetic rubber, and are intended for use in flammable anesthetizing locations where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health

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Care Facilities, NFPA No. 99 and that the mattresses and pads, when in contact with grounded objects, will prevent accumulation of dangerous amounts of static electrical charges.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Electrically Conductive Mattress Relating to Hazardous Locations" or "Electrically Conductive Pad Relating to Hazardous Locations".

MEASUREMENT EQUIPMENT, CLASSIFIED, FOR USE IN HAZARDOUS LOCATIONS (PICX)

This category includes equipment intended for measuring physical properties, such as thickness and density, on a production line.

Measuring equipment in this category have been evaluated for risk of explosion, fire and electric shock only.

The basic standards used to investigate products in this category are UL508", Industrial Control Equipment", UL913", Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations", UL1203", Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL1604", Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations", as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. as appropriate (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

The Classification Marking consists of the UL Mark together with the word "CLASSIFIED" (as illustrated in the Introduction of this Directory), the following statement and a control number.

AS TO FIRE, ELECTRICAL SHOCK
AND EXPLOSION HAZARDS ONLY

MEDICAL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (PINR)

These listings include portable suction, pressure, and anesthesia units, portable baby incubators, surgical devices, and similar equipment, designed for professional use by attendants in hospitals. This equipment has been investigated solely from the standpoint of electrical, fire, explosion, and accident hazards. Other hazards, such as physiological effects have not been investigated.

Except for low voltage battery powered devices, connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, Listed for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary. Terminal connections should be properly made and maintained.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

These devices should be used in accordance with the Standard of the National Fire Protection Association for Health Care Facilities, NFPA No. 99.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Medical Equipment for Hazardous Locations" or other appropriate product name as shown in the individual listing.

METAL-CLAD CABLE FOR USE IN HAZARDOUS LOCATIONS (PJPP)

GENERAL

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This category covers Type MC metal-clad cable for use in Class I and II, Division 1 hazardous (classified) locations. It is rated for use up to 35,000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset or thermoplastic insulated conductors. It is intended for installation in accordance with Articles 334, 501 and 502 of NFPA 70, "National Electrical Code" (NEC). Cable containing conductors rated 2 kV may be used in circuits operating at 2 kV, nominal or less, in accordance with Articles 600 and 710 of the NEC. Cable containing conductors rated 5,000 to 35,000 V is intended for installation and use in accordance with Articles 326, 501 and 502 of the NEC.

The cable consists of two or more insulated conductors, one or more grounding conductors, and an overall gas/vapor tight continuous corrugated aluminum sheath. A nonmetallic jacket is provided over the metal sheath.

The equipment grounding conductor required within a cable may be insulated or bare and may be sectioned. Any additional grounding conductors have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown on the surface of a nonmetallic jacket. The cable is identified as "Type MC-HL." Cable rated 5,000 to 35,000 V is marked "Type MV or MC-HL."

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-clad AL." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

For termination information see Cable Sealing Fittings for Use in Hazardous Locations (CYMX).

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

Cable evaluated in accordance with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" may be marked with the suffix "LS."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1569, "Metal-Clad Cables" and UL 2225, "Metal-Clad Cables and Cable Sealing Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductor has the product name "Metal-Clad Cable for Hazardous Locations"; metal-clad cable that contains aluminum conductor has the product name "Metal-Clad Aluminum Cable for Hazardous Locations."

MINERAL INSULATED CABLE ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (POWD)

The products in this category consist of lengths of Listed mineral insulated metal-sheathed cable with one or both ends factory terminated with a Listed mineral insulated cable fitting for hazardous locations. The fittings provide threaded connection of the cable to hazardous locations equipment.

The basic standard used to investigate products in this category is UL886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations."

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The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Mineral Insulated Cable Assembly for Hazardous Locations" or other appropriate product name as indicated in the individual Listing.

MINERAL INSULATED CABLE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (POWX)

This category covers termination fittings for providing threaded connection of mineral insulated cable to hazardous location equipment.

These fittings are provided with a screw-on pot for sealing ends of cable with special compound supplied by the manufacturer of fittings and a connector having conduit threads for attachment to hazardous location equipment.

The basic standard used to investigate products in this category is UL886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Mineral Insulated Cable Fitting for Hazardous Locations" .

MOTORS AND GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSBV)

GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSPT)

GENERAL

This category covers generators for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous locations.

Unless otherwise marked, generators for use in Class I and Class II hazardous locations are intended for use in ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F).

The Listing Mark on a generator applies to the generator, but not to any equipment driving or driven by the generator. In the case of a motor generator set provided with a common base, the motor and generator will each bear its respective Listing Mark.

RELATED PRODUCTS

For rebuilt generators see Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Generator for Hazardous Locations."

MOTORS FOR USE IN HAZARDOUS LOCATIONS (PTDR)

GENERAL

This category covers motors for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous locations.

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Unless otherwise marked, motors for use in Class I and Class II hazardous locations are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Listing Mark on a motor applies to the motor, but not to any equipment driving or driven by the motor. In the case of a motor generator set provided with a common base, the motor and generator each will bear its respective Listing Mark.

Some motors are provided with inherent overheating protective devices which are Recognized by Underwriters Laboratories Inc.

RELATED PRODUCTS

For rebuilt motors, see Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Hazardous Locations."

MOTORS, DIVISION 2 FOR USE IN HAZARDOUS LOCATIONS (PTHE)

GENERAL

This category covers electric motors for use in Class I, Division 2, Groups A, B, C and D, and Class II, Division 2, Groups F and G hazardous (classified) locations.

For Class I, Division 2 locations, the enclosure may be of the open or totally-enclosed type. The Group designation is marked unless the motor is acceptable for Groups A, B, C and D. The motor is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated full load steady state conditions, if the temperature is greater than 100°C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically sealed enclosure, constructed with current interrupting contacts immersed in oil, located in a nonincendive circuit, or located in a purged and pressurized enclosure. If the motor is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor is de-energized, and vice versa. The maximum surface temperature of the space heater is marked on the motor, if the temperature exceeds 80 percent of the operating temperature of the motor.

For Class II, Division 2 locations, the enclosure is of the totally enclosed type. The motor is marked with the operating temperature or operating temperature code designating the maximum full load external temperature determined at rated full load steady state conditions when operating in free air (not dust blanketed), if the external temperature is greater than 100°C.

RELATED PRODUCTS

For Division 1 motors, see Motors for Use in Hazardous Locations (PTDR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1836, "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2 and Class II, Division 2 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Division 2 Hazardous Locations."

MOTORS AND GENERATORS, REBUILT FOR USE IN HAZARDOUS LOCATIONS (PTKQ)

USE

This category covers rebuilt motors and generators for use in Class I, Groups C and D, and Class II, Groups E, F and G hazardous locations.

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Unless otherwise marked, rebuilt motors and generators for use in Class I and Class II hazardous location are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rebuilt Electric Motor [or Generator] for Hazardous Locations."

The Listing Mark on a rebuilt motor or generator applies to the motor or generator, but not to any equipment driven by or driving the motor or generator. In the case of a rebuilt motor generator set provided with a common base the motor and generator will each bear its respective Listing Mark.

MOTORS, SPECIALTY FOR USE IN HAZARDOUS LOCATIONS (PUCJ)

USE AND INSTALLATION

This category covers specialty motors for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous (classified) locations.

These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Listing Mark on a specialty motor applies to the motor, but not any equipment driving or driven by the motor.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Specialty Motor for Use in Hazardous Locations."

OFFICE APPLIANCES AND BUSINESS EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QAVS)

GENERAL

This category covers equipment and appliances normally used in business establishments classified as hazardous locations.

The equipment and appliances may be electromechanical and/or electronic.

Intrinsically safe equipment is so marked on the product.

To maintain the intrinsically safe features of battery operated appliances, only batteries of the type and size indicated on the product should be used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Office Appliance for Use in Hazardous Locations" or "Business Equipment for Use in Hazardous Locations."

OUTLET BOX ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (QAZV)

See also outlet boxes, conduit fittings, and fixture fittings.

Conduit box bodies, flat or domed covers, fixture hanger covers, threaded extensions, sealing hub covers and similar subassemblies of outlet boxes, fixture fittings, and conduit fittings are included in this category. They are intended to be assembled at the factory or in the field by the user to form a complete explosion-proof or dust-ignition proof enclosure. Information on restrictions in the use and assembly of these devices are marked on each part.

The basic standard used to investigate products in this category is UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name "Outlet Box Accessory for use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

OUTLET BOXES FOR USE IN HAZARDOUS LOCATIONS (QBCR)

GENERAL

This category covers conduit boxes for use in threaded rigid conduit or steel intermediate metal conduit wire raceways. They provide for splicing of conductors, but conductors should not be sealed in conduit boxes. The boxes are marked to indicate when accessories such as unions and sealing fittings are furnished with the box.

Boxes marked "rain tight" have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in entrance of water.

Cast-aluminum alloy outlet boxes are not considered acceptable for installation in concrete or cinder fill unless protected with asphalt base paint or the equivalent.

RELATED PRODUCTS

See Conduit Fittings for Use in Hazardous Locations (EBNV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate explosion-proof and dust-ignition-proof products in this category is UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations." The basic standard used to investigate dusttight products in this category is UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Box for Hazardous Locations."

PAINTING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QDIY)

This category covers electrostatic hand spray apparatus and associated equipment such as high voltage power supplies and power cable.

The spray gun and power cable have been investigated for use in the spray area. The high voltage power supply is to be located outside of the spray area in a nonhazardous location.

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Electrostatic hand spraying equipment is intended to be installed and used in accordance with the Standard of the National Fire Protection Association for Spray Application Using Flammable and Combustible Liquids, NFPA 33. Instructions furnished with the equipment by the manufacturer should be carefully observed.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Painting Equipment for Use in Hazardous Locations".

PAINT SPRAY BOOTHS WITH FIRE PROTECTION SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (QEFY)

USE

This category covers paint spray booths for liquid and powder coating finishing processes as defined in Article 516 of NFPA 70, "National Electrical Code" (NEC) and in NFPA 33, "Spray Application Using Flammable and Combustible Materials." Some of the booths may alternatively be used for drying, and may utilize electric heating, gas, gas-oil, or an oil-fired heating system. The type of heating employed is indicated in the individual Listings.

These paint spray booths are intended for field erection indoors in accordance with instructions furnished by the manufacturer and the information marked on the equipment. They are intended to be installed and used in accordance with applicable requirements in NFPA 33 and Article 516 of the NEC. Paint spray booths located within a commercial garage are to be installed as defined in Article 511 of the NEC.

FIRE PROTECTION

Paint spray booths are provided with either (1) an integral engineered fire extinguishing system that must be regularly inspected and/or recharged or (2) with automatic sprinklers that are connected to a separate water supply in accordance with NFPA 13, "Installation of Sprinkler Systems."

COATING MATERIALS

These paint spray booths are intended for spray operations using a single type of coating material. Due to the possibility of spontaneous ignition, different types of coating materials should not be alternately used unless all deposits of the first used material are removed from the booth and ducts, and all paint contaminated filters are replaced or cleaned prior to spraying with the second type of coating material.

The toxicity of coating materials that may be used and the ability of the spray booth to provide protection for the painter and/or booth operator from coating material fumes have not been evaluated. Proper precautions as recommended by the paint manufacturer should be followed.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in NFPA 33, "Spray Application Using Flammable and Combustible Materials."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names and information, as appropriate: (A) "Paint Spray Booth for Automobile Refinishing," (B) "Paint Spray Booth" or (C) "Paint Spray Booth for Use Only with (Company Name) Labeled (Gas) (Gas-Oil) (Oil) Burner Model(s). Maximum Input (BTU Per Hour) (Gals Per Hour). Refer to Burner Nameplate for Control and Fuel Specifications."

A paint spray booth that includes the burner as part of the factory-furnished assembly bears a Listing Mark with the product name and information as outlined in (A) or (B).

A paint spray booth assembly intended for installation of the burner in the field bears a Listing Mark with the product name and information similar to the text in (C). The burner bears a separate Listing Mark.

PANELBOARDS FOR USE IN HAZARDOUS LOCATIONS (QFIW)

USE

This category covers enclosed panelboards under Class I and Class II groups of the manually operable, air break type, employing circuit breakers having automatic overload protection.

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These enclosed panelboards are intended for lighting and low capacity power distribution.

These panelboards are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Each marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Panelboard for Hazardous Locations."

PARTS CLEANERS FOR USE IN HAZARDOUS LOCATIONS (QGKR)

Parts cleaners for use in hazardous locations are specially designed stationary units intended for use with cleaning solvents to wash and clean grease and/or dirt from metal parts at essentially room temperature.

Those parts cleaners which employ electric-motor driven pumps are intended for use only with Metal Parts Cleaning Solvents which have been Classified by Underwriters Laboratories Inc. in the range 20-30 and with a flash point not less than 140 F or in the range of 30-40 with a flash point not less than 100 F.

The physiological effects of the solvent, in any form, have not been investigated by Underwriters Laboratories Inc. and are not covered by the Listing.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Parts Cleaners For Use In Hazardous Locations" and if applicable, one of the following statements: "For use only with Metal Parts Cleaning Solvents Classified by Underwriters Laboratories Inc. in the range 20-30 with a Flash Point not less than 140 F" or "For use only with Metal Parts Cleaning Solvents Classified by Underwriters Laboratories Inc. in the range of 30-40 with a flash point not less than 100 F."

PERSONAL PROTECTIVE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QGWX)

These products are intended for use by individuals to provide a degree of protection against personal injury. They have been Classified in accordance with specific nationally recognized standards or Federal specifications as noted under the specific sub-guides.

The basic standard used to investigate products in this category is UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III".

OCCUPATIONAL HEAD PROTECTION FOR USE IN HAZARDOUS LOCATIONS (QGXT)

These products are intended for protection of heads of occupational workers from impact and penetration from falling or flying objects and from limited electric shock and burn. They have been Classified for use in hazardous locations in accordance with the National Electrical Code and in accordance with either the American National Standard Safety Requirements for Industrial Protective Helmets for Electrical Workers, Class B (ANSI Z89.2) or the Safety Requirements for Industrial Head Protection (ANSI Z89.1), or both. They may include reference to specific Federal specifications as noted under individual classifications.

The basic standard used to investigate products in this category is UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters

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Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service. The Standards referenced in the Classification Marking vary to conform with those shown in the individual Classification.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.® IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD SAFETY REQUIREMENTS FOR INDUSTRIAL PROTECTIVE HELMETS FOR ELECTRICAL WORKERS, CLASS B (ANSI Z89.2). FOR USE IN HAZARDOUS LOCATIONS.

PLUMBING ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (QNHV)

GENERAL

This category covers pump assemblies and controls for use in pumping sewage. Assemblies exposed to sewage have constructions intended to reduce corrosion of enclosure parts and explosion-proof joints. They have not been evaluated for use where severe corrosive conditions are likely to be present.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1207, "Sewage Pumps for Use in Hazardous (Classified) Locations" (includes references to UL 508, UL 674, UL 698 and UL 913).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Control Unit for Use in Hazardous Locations" or "Submersible Sump Pump for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

PORTABLE LIGHTING UNITS FOR USE IN HAZARDOUS LOCATIONS (QPKX)

Portable lighting units listed for use in any of the groups under Class I hazardous locations have been tested in respect to safety of operation in the presence of flammable and explosive mixtures of specific gases and vapors with air as indicated in the respective listings. Lamp compartments are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having grounding conductor.

Portable lighting units for any of the groups under Class II hazardous locations have been tested for dust tightness and safe external temperatures in the presence of the specific combustible dust. Inasmuch as it is not good practice to allow combustible dust to accumulate on equipment or in buildings, the equipment should be kept clean and carefully maintained. Lamp compartments are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having grounding conductor.

Portable lighting units Listed for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

Connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, listed for the specified hazardous locations. The flexible cord connected to the units should be frequently examined and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL781, "Portable Electric Lighting Units for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Lighting Unit For Hazardous Locations".

PROCESS CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QUZW)

USE AND INSTALLATION

This category includes process control equipment consisting of instruments for measurement, recording and/or control of process variables, and auxiliary devices used therewith such as sensors, transducers and valve operators.

Intrinsically safe systems covered by these Listings have been investigated on the basis that all equipment connected to the system is Listed as part of the system unless otherwise indicated and is used as intended.

INSTALLATION INSTRUCTIONS

Safety may be affected if the manufacturer's installation instructions are not followed.

Equipment intended to be installed only in process control panels is so identified in the listing. Such equipment is not intended for field installation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations," UL 1203, "Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate. The basic nonhazardous location standard used to investigate products in this category is UL 508, "Industrial Control Equipment."

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Process Control Equipment for Hazardous Locations," "Process Control System for Hazardous Locations," "Process Control Unit for Hazardous Locations," "Process Control Equipment (Associated Apparatus)," "Process Control Unit (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RFPW)

GENERAL

This category covers purging and pressurizing controls and accessory parts intended to be connected to electrical equipment enclosures that are to be purged and pressurized with clean air or nonflammable gas in accordance with NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment." This category does not cover the purged or pressurized electrical equipment. Purged or pressurized electrical equipment is covered under the individual product category for the particular type of equipment.

TYPES

NFPA 496 specifies the following pressurization types:

Type X — Reduces the classification within an enclosure from Division 1 to nonhazardous.

Type Y — Reduces the classification within an enclosure from Division 1 to Division 2.

Type Z — Reduces the classification within an enclosure from Division 2 to nonhazardous.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations," UL 913, "Intrinsically Safe

Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product name "Purge Control for Use in Hazardous Locations" or "Purge Control Accessory for Use in Hazardous Locations" or other appropriate product name as shown in the individual Classifications, and the following additional information:

IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD FOR PURGED AND PRESSURIZED ENCLOSURES FOR ELECTRICAL EQUIPMENT NFPA 496

RADIO DEVICES FOR USE IN HAZARDOUS LOCATIONS (RMGR)

This category includes portable signal receivers, Portable Signal and Voice Receivers, and Portable Voice Transceivers.

The basic standard used to investigate products in this category is UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Radio Device for Hazardous Locations".

For a product which is so small that the complete Listing Mark can not be placed on it, the symbol UL in a circle appears on the product and the complete Listing Mark is contained on the smallest unit packaging or in the instruction manual/user's guide provided with each unit.

RECEPTACLE-PLUG COMBINATIONS FOR USE IN HAZARDOUS LOCATIONS (RRAT)

Receptacles with plugs, receptacles with plugs interlocked with circuit breakers, and receptacles with plugs interlocked with switches are included under this category.

RECEPTACLE-ENCLOSURE COMBINATIONS WITH PLUGS FOR USE IN HAZARDOUS LOCATIONS (RREG)

Receptacle-Enclosure Combinations With Plugs are intended for use in one or more of the following hazardous locations, as indicated on the product, in accordance with the National Electrical Code: Class I, Groups A, B, C and D; Class II, Groups E, F, and G.

Receptacle-Enclosure Combinations With Plugs covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the product classification. Assembly of the Receptacle-Enclosure Combinations With Plugs in the field is to be in accordance with the instructions provided with the product by the manufacturer.

Enclosures under this category are for threaded rigid conduit connection, and the conductors between the receptacle and the enclosure are factory sealed. The plugs are for use with Type SO ST or STO flexible cord having a grounding conductor.

The flexible cord connecting to the plugs should be frequently inspected and replaced when necessary. Terminal connection to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at the current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to the conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

Receptacle-Enclosure Combinations With Plugs Classified for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of The National Electrical Code.

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The basic standard used to investigate products in this category is UL 1010, "Receptacles-Plug Combination for Use in Hazards (Classified) Locations".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
AS TO EXPLOSION AND FIRE HAZARD ONLY.
RECEPTACLE-ENCLOSURE COMBINATIONS WITH PLUGS
FOR USE IN HAZARDOUS LOCATIONS
CLASS _____, Group _____**

**RECEPTACLE-PLUG COMBINATION,
ACCESSORIES FOR USE IN HAZARDOUS
LOCATIONS (RRHS)**

This category covers receptacles classified for use only with Listed plugs, and plugs classified for use only with Listed receptacles, as specified in the instructions provided with the product. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which plugs and receptacles will be permitted for use. It is recognized that portable equipment should be used only where necessary.

Receptacles and plugs Listed for use in Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The basic standard used to investigate products in this category is UL1010, "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE WITH LISTED _____ * _____ SPECIFIED IN
THE INSTRUCTIONS PROVIDED WITH THE PRODUCT.
_____ * _____ "RECEPTACLES" or "PLUGS"**

**RECEPTACLES WITH PLUGS FOR USE IN
HAZARDOUS LOCATIONS (RROR)**

Receptacles with plugs Listed under Class I and Class II groups for Division 1 locations are provided with receptacle conduit boxes for threaded rigid conduit connection, and the conductors between receptacles and conduit boxes are factory sealed. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles Listed for Class I, Division 2 locations only are intended for use with general purpose enclosures for supply connections. The supply conductors are factory sealed in the receptacles. The plugs for use with such receptacles are suitable for Class I, Division 1 locations.

Receptacles with plugs for groups under Class I hazardous locations have been subjected to endurance tests and overload operation tests in the presence of the specific flammable vapor-air atmospheres.

Receptacles with plugs for any of the groups under Class II hazardous locations have dust tight terminal boxes and have been subjected to endurance tests and overload operation tests while heavily blanketed with combustible dust. Receptacles with plugs Listed for Class II, Groups F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Some receptacles and plugs are Listed for "Reverse Service" applications on marine vessels, for conformity to the installation and use provisions of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 CFR, Parts 110 to 113 inclusive), as identified by the individual Listing and marked on the products. Reverse service plugs and receptacles are not suitable for applications other than those governed by the above Coast Guard Regulations.

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Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL1010, "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Plug for Hazardous Locations", "Receptacle Assembly for Hazardous Locations", "Reverse Service Plug for Hazardous Locations" or "Reverse Service Receptacle for Hazardous Locations".

**RECEPTACLES WITH PLUGS
INTERLOCKED WITH CIRCUIT BREAKERS
FOR USE IN HAZARDOUS LOCATIONS
(RSBZ)**

Receptacles with plugs interlocked with circuit breakers Listed under Class I and Class II groups are constructed with interlocked circuit breaker and plug so that the plug cannot be withdrawn or inserted when the circuit breaker is closed. These devices have provision for connection of threaded rigid conduit to the circuit breaker compartments and the plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles with plugs interlocked with circuit breakers Listed for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plugs and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL1010, "Receptacle-Plug Combinations for Use in Hazardous Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Receptacle interlocked with Circuit Breaker for Hazardous Locations" or "Plug for Hazardous Locations".

**RECEPTACLES WITH PLUGS
INTERLOCKED WITH SWITCHES FOR USE
IN HAZARDOUS LOCATIONS (RSPX)**

Receptacles covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the individual Listings. Final assembly of receptacles in the field is to be done in accordance with instructions provided with the product by the manufacturer.

Receptacles with plugs interlocked with switches Listed under Class I and Class II groups are constructed with interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit to the switch compartments. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles with plugs interlocked with switches Listed for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The devices which are provided with a factory seal of conductors between switch and the conduit box are so identified on the individual product.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

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Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL1010, "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Receptacle Interlocked with Switch for Hazardous Locations", "Plug for Hazardous Locations", "Receptacle Cover Assembly Interlocked with Switch for Hazardous Locations", or "Body Assembly for Hazardous Locations".

REELS, CORD FOR USE IN HAZARDOUS LOCATIONS (SAOX)

This category includes cord reels for use with Type S, SO or STO cord, having a grounding conductor, for connecting portable electrical devices to supply lines. A terminal compartment is provided for connection to threaded rigid conduit systems.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The flexible cord should be inspected frequently and replaced when necessary. Terminal connections to the cord should be properly made and maintained.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 355, "Cord Reels".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name: "Cord Reel for Use in Hazardous Locations", or other appropriate product name as noted in the individual Listing..

REFRIGERATION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (SSCR)

ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (SSPZ)

Controllers, Refrigeration for Use in Hazardous Locations (STDx)

GENERAL

This category covers temperature- and pressure-operated controllers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Refrigeration Controller for Use in Hazardous Locations."

COMMERCIAL REFRIGERATORS AND FREEZERS FOR USE IN HAZARDOUS LOCATIONS (STRV)

GENERAL

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This category covers commercial refrigerators and freezers of the self-contained reach-in type, having provision for connection to threaded rigid conduit.

In the storage of any chemicals in the refrigerators and freezers, consideration should be given to the inherent decomposition and reaction hazards of the chemicals.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Refrigerator and/or Freezer for Hazardous Locations."

WATER COOLERS FOR USE IN HAZARDOUS LOCATIONS (SUFT)

GENERAL

This category covers bottled water and line supplied types of water coolers.

The appliances are self-contained units with complete refrigeration system associated with electrical control. The refrigeration system has provision for connection to threaded rigid conduit.

UNEVALUATED FACTORS

The appliances that are intended to be connected to external water sources have not been investigated with respect to pollution of water supply through reverse action due to low water pressure or other reasons.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Water Cooler for Use in Hazardous Locations."

RELEASING DEVICE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TBCX)

Releasing Devices with accessory equipment are designed to release operating weights or air or water under pressure in the functioning of fire protection and fire alarm equipment.

They are available in both heat responsive (automatic) and manual types. The heat responsive types may be had in either fixed temperature or rate-of-rise types or a combination of these two.

The heat responsive portions of releasing devices are integral parts of some patterns. In other patterns they are separate parts, such as air chambers which are mounted in the fire area and connected by small-bore tubing to the releasing device; or thermostatically operated electric switches (thermostats) mounted in the fire area and connected by an electric wiring circuit to the releasing device. Devices which have normally open contacts are listed as "Heat-Automatic Fire Detectors" and those which have normally closed contacts are listed as "Heat Detectors for Releasing Device Service."

Proper location and spacing of the auxiliary heat responsive devices (heat detectors, air chambers, tubing, etc.) involve consideration of service conditions throughout the area to be protected - such as ceiling construc-

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tion, subdivisions of areas (including closets, small rooms, etc.) normal temperatures, high temperatures (if existent), resulting from manufacturing processes or other causes and draft conditions. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and recognizes that specific system settings, abnormal temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations. Individual Listings should be consulted for details of spacing and locations of the heat responsive devices.

The Inspection Authority Having Jurisdiction should be consulted in all cases before installation of systems or devices.

HEAT DETECTORS FOR RELEASING DEVICE SERVICE FOR USE IN HAZARDOUS LOCATIONS (TBGR)

USE AND INSTALLATION

This category covers heat detectors having normally closed circuit contacts used for thermo-responsive elements of releasing systems.

These heat detectors have been investigated for indoor use only unless otherwise indicated in the individual Listings.

These detectors are intended to be installed in accordance with NFPA 72E, "Automatic Fire Detectors."

The operating principles included in the Listings are coded as follows: ROR - Rate of rise; FT - Fixed temperature; ROR-FT - Combination rate of rise and fixed temperature; RC - Rate compensation.

RELATED PRODUCTS

For heat detectors having normally open contacts, see Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION

For additional information, see Releasing Device Equipment for Use in Hazardous Locations (TBCX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Detector for Releasing Device Service for Use in Hazardous Locations."

RELEASING DEVICES FOR USE IN HAZARDOUS LOCATIONS (TBJW)

Some types of releasing devices are for use in supporting and releasing loads in connection with automatic operating devices or systems where loads at release lever hook do not exceed those specified in the individual Listings.

Other types of releasing devices are for use as a means of releasing air or water under pressure from a piping system confining and conducting that pressure through pipes or tubing to operate any connected pressure-operated mechanism.

A releasing device and its associated detection system may be adjusted to compensate for more or less severe ambient temperature changes by different settings of the release or by varying the size of the compensating vents in the system to increase or decrease the rate of pressure built up caused by exposure to some given temperature rise. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and recognizes that specific system settings, abnormal temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations.

Additional information on units for Releasing Device Service can be found in the General Information Section of the following categories:

Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).

Heat-Automatic Fire Detectors for Use in Hazardous Locations (UIRV).

The basic ordinary locations standard used to investigate products in this category is UL 864, "Control Units for Fire-Protective Signaling Systems."

The basic hazardous locations standard used to investigate products in this category is UL 1203, "Explosion-Proof and Dust-Ignition-proof Electrical Equipment for Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Releasing Devices for Hazardous Locations."

REPACKAGED HAZARDOUS LOCATIONS EQUIPMENT (TEPD)

Products covered under this category are repackaged Listed or Classified products of the type covered in the Hazardous Location Equipment Directory.

Required user instructions and ratings are marked or packaged with the smallest unit container in which the product is packaged.

The Listing Mark or Classification Marking of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing or Classification and Follow-Up Service. The Listing Mark for these product includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and the appropriate product name. The Classification Marking for these products consists of the Classification Marking (and any rating or design information required as part of the Classification Marking) provided by the original manufacturer of the Classified product and a control number. The Classification Marking may include the symbol UL in a circle in conjunction with the word "CLASSIFIED".

ROTARY AUTOMATIC PRODUCT FILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TONI)

This category includes equipment for automatically filling fluids into aerosol cans, bottles and similar containers.

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Rotary Automatic Product Filling Equipment for Hazardous Locations", "Product Filling Equipment for Hazardous Locations" or other appropriate product name as shown in the individual Listing.

SHEETING, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (UBQX)

These sheetings, made of a material coated with an electrically conductive compound, are intended for use as coverings for mattresses and pads in hospital operating rooms where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA No. 99, and that the sheeting, when in contact with grounded objects, will prevent accumulation of dangerous amounts of static electrical charges.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Sheeting Relating to Hazardous Locations".

SHIELDED NONMETALLIC SHEATHED CABLE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (UBVX)

This category covers termination fittings for providing threaded connection of shielded nonmetallic-sheathed cable to equipment in Class I, Division 2 hazardous locations.

Unless otherwise indicated, these fittings have not been investigated as sealing fittings.

The basic standard used to investigate products in this category is UL886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Shielded Nonmetallic-Sheathed Cable Fitting for Use in Hazardous Locations".

SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)

Equipment for use in hazardous locations investigated for fire-protective signaling service also appears under Signal and Fire Alarm Equipment and Services (SYKJ) in the Fire Protection Equipment Directory.

AUDIBLE-SIGNAL DEVICES FOR USE IN HAZARDOUS LOCATIONS (UGKZ)

GENERAL

This category covers audible-signal devices, such as bells, sirens and horns.

Audible-signal devices Listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been tested for dusttightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts, and also to establish that they will function as intended with dust accumulated on external parts.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Audible Signal Appliance for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

EXTINGUISHING SYSTEM ATTACHMENTS FOR USE IN HAZARDOUS LOCATIONS (UGYX)

USE AND INSTALLATION

This category covers devices having electrical signaling contacts that are designed for attachment to extinguishing system equipment so as to provide:

- (a) Alarm signals indicating discharge of extinguishing means.
- (b) Supervisory signals indicating abnormal conditions of extinguishing system equipment and restoration to normal.

The signal contacts of these attachments may be of the non-coded type or coded type.

Devices classified as non-coded types have contacts which perform a switching function and are for connection to actuating circuits of a separate electrically operated transmitter or to the signaling line circuit of a separate electrical control unit by which their action is indicated.

Devices classified as coded type have contacts which perform a coded signaling impulse function resulting from the operation of a transmitting mechanism which is a part of the attachment and are for connection to the signaling line circuit of a separate electrical control unit by which their action is indicated.

Attachments for automatic sprinkler systems are classified as follows:

Waterflow Alarm Signal Types

Alarm Dry-Pipe Valve Attachment — Mechanically operated on lifting of alarm valve clapper or pressure operated by suitable connection to alarm or dry-pipe valve piping trim.

Waterflow Indicators — Paddle operated.

Special Attachment — Type not included by above classification.

Supervisory Signal Types

Valve Position Signal Attachment — Operated by mechanical linkage to movable parts of valve.

Water Level Signal Attachment — Operated by tank float.

Pressure Signal Attachment — Operated by pressure change of air, steam or water.

Temperature Signal Attachment — Operated by water or air temperature change.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Extinguishing System Attachment for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

FIRE ALARM DEVICES FOR USE IN HAZARDOUS LOCATIONS (UHMV)

USE AND INSTALLATION

This category covers coded and non-coded fire alarm boxes and fire and watch boxes for use with private fire alarm systems.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Fire Alarm Box for Hazardous Locations" or "Fire and Watch Box for Hazardous Locations."

FLAME-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIAZ)

USE AND INSTALLATION

This category covers fire detectors designed to detect flames, either in infrared or ultraviolet regions.

Each detector provides signaling contacts for connection to a signal-indicating appliance, electrically actuated transmitters, or a system control unit to form a fire alarm system as indicated by an installation wiring diagram supplied with the unit.

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Each unit is intended to be installed in accordance with the manufacturer's control drawing, the Authority Having Jurisdiction, and NFPA 72E, "National Fire Alarm Code" or other NFPA Standards which may apply.

DETECTOR LOCATION

The location of flame detectors should be based on an engineering survey of the conditions to be anticipated in service and the principle of operation. Detectors should be installed only after a thorough study has been made of the area or premises to be protected (whether in planning or construction stage) and of the life and property values involved. Prior to engineering, a layout of an installation and a copy of the manufacturer's technical bulletin should be obtained and reviewed to determine recommended detector locations. Consideration should be given to all features which could have a bearing on the location and sensitivity of the detectors, including such pertinent factors as coverage in partitioned sections, ceiling heights, and overlapping of areas of cone coverage to provide maximum protection. Test flames should be employed to check proper detector location.

ENVIRONMENTAL CONSIDERATIONS

Where indicated in the individual Listings, detectors are intended for indoor and/or outdoor use. For indoor use, detectors should be located in areas where normal ceiling temperatures prevail. For outdoor use, detectors should be located such that an accumulation of snow, dirt, or road film is not likely to occur on the lens. Accordingly, detectors should be located under a building overhang or positioned on a downward angle to minimize the occurrence of such conditions.

Detectors should not be installed where unwanted false alarms are likely to occur, such as other sources of ultraviolet or infrared radiation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 268, "Smoke Detectors for Fire Protective Signaling Systems."

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations," UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations" and UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flame-automatic Fire Detector for Use in Hazardous Locations."

GROUND INDICATORS FOR USE IN HAZARDOUS LOCATIONS (UIOR)

GENERAL

This category covers electronic type ground indicators, the ratings of which are given on the individual product. These devices indicate by audible or visible signals whether an adequate connection to gasoline tank trucks, tank cars, or drums has been established for dissipation of static electricity.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground Indicator for Use in Hazardous Locations."

HEAT ACTUATED DEVICES FOR SPECIAL APPLICATION FOR USE IN HAZARDOUS LOCATIONS (UIPV)

USE AND INSTALLATION

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This category covers fixed temperature heat actuated type detectors employing special constructions designed to detect an abnormal increase in air temperature.

These detectors are intended to be installed adjacent to the equipment being protected in indoor locations in a manner acceptable to the local authority having jurisdiction and in accordance with NFPA 72E, "Automatic Fire Detectors" or other NFPA Standards which may apply, such as for extinguishing system applications. The temperature rating of the detector shall be taken into consideration with regard to installation in specific ambient environments under operating conditions of the equipment to be protected. The detectors are intended to be connected to the initiating device circuits of Listed control units which provide audible alarm signals or employed as part of an extinguishing system. Authorities Having Jurisdiction should be consulted before installation.

Spacings for Equipment Protection — Reference should be made to the manufacturer's installation drawings and instructions. Spacings for smooth ceilings with large bays are included in the individual Listings. For open area protection, see Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Actuated Device for Special Application for Use in Hazardous Locations."

HEAT-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIRV)

USE AND INSTALLATION

This category covers fire alarm heat detectors only, and not wiring or other appliances of which they form a part.

Fire alarm heat detectors are of the fixed temperature, combination fixed temperature and rate-of-rise or rate compensation types. There are basically two types: (1) Spot-type is one in which the thermally sensitive element is a compact unit of small area, and (2) Line-type is one in which the thermally sensitive element is continuous along the line.

Heat detectors are intended for locations where normal ceiling temperatures prevail (below 100°F).

Locations where temperatures at ceiling are likely to be unduly high, for sources of heat other than fire conditions, demand special consideration and selection of heat detectors operating normally at higher temperatures, and which are capable of withstanding high temperatures for long periods of time. Care should be exercised to select heat detectors having the proper temperature rating to guard against false alarms from premature operation.

These detectors are intended to be installed in accordance with NFPA 72E, "Automatic Fire Detectors."

For ceiling temperatures not exceeding 100°F install 135 to 165°F (ordinary) rated thermostats.

For ceiling temperatures exceeding 100°F, but not 150°F, install intermediate 175 to 225°F rated thermostats.

For ceiling temperatures exceeding 150°F, but not 225°F, install 250 to 300°F (high) rating thermostats.

For ceiling temperatures exceeding 225°F, but not 300°F, install 325 to 360°F (extra high) rating thermostats.

Low-degree rated heat detectors are intended only for installation in areas having controlled temperature conditions at least 20°F below rating.

The spacings specified are for flat, smooth ceiling construction of ordinary height, generally regarded as the most favorable condition for distribution of heated air currents resulting from a fire. Under other forms of ceiling construction reduced spacing of thermostats may be required. The fire tests conducted to determine the suitability of the spacings are conducted in a 60 by 60 ft room having a 15 ft 9 in. high smooth ceiling and minimum air movement. The test fire (denatured alcohol) is located approximately 3 ft above the floor and of a magnitude so that sprinkler operation is obtained in approximately two minutes. For comparative purposes, automatic sprinklers rated 160°F are installed on a 10 by 10 ft spacing schedule in an upright position with the deflectors approximately 7 in. below the ceiling.

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At the maximum permissible spacing for the heat detectors, they must operate prior to operation of the sprinklers.

The placement and spacing of thermostatic devices should be based on consideration of the ceiling construction, ceiling height, room or space areas, space subdivisions, the normal room temperature, possible exposure of the devices to abnormal heat, such as may be produced by manufacturing processes or equipment and to draft conditions likely to be encountered at the time of a fire.

The operating principles included in the listings are coded as follows: ROR – Rate of rise; FT – Fixed temperature; ROR-FT – Combination rate of rise and fixed temperature; RC – Rate compensation.

For Listings that include references to “rain tight type,” the devices have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

For heat detectors having normally closed contacts used in special applications, see Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fire Detection Heat Detector for Use in Hazardous Locations.”

SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (UJFT)

USE AND INSTALLATION

This category covers units intended to be used in combinations with related Listed equipment to form installed systems for general utility signaling purposes.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Signal System Unit for Use in Hazardous Locations” or “Signal System Unit (Associated Apparatus) for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SIGNAL APPLIANCES, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (UJPX)

USE

This category covers miscellaneous signal appliances and equipment used in signaling systems.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

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The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Magnetic-Operated Contact for Use in Hazardous Locations,” “Signal Relay for Use in Hazardous Locations,” “Monitor Unit (Associated Apparatus) for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SIGNALING EQUIPMENT ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (UJQO)

USE

This category covers retrofit devices in kits consisting of parts and/or subassemblies, installation/instruction manuals, and retaining means, intended for field installation in UL Listed audible signaling appliances for use in hazardous locations. These products have been evaluated by UL to determine that when used in accordance with the manufacturer’s instructions they do not adversely affect the operation of the complete unit.

PRODUCT MARKINGS

Retrofit devices are marked with electrical and environmental ratings as specified in the individual report.

ADDITIONAL INFORMATION

For additional information, see Signal Appliances for Use in Hazardous Locations (UFXX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic ordinary locations standards used to investigate products in this category are UL 464, “Audible Signal Appliances” or UL 1480, “Speakers for Fire Protective Signaling Systems,” as appropriate. The basic hazardous locations standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations,” UL 1203, “Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, “Audible Signal Retrofit Kit,” and “FOR USE WITH LISTED [insert model number(s)] ONLY.”

VISUAL-SIGNAL DEVICES FOR FIRE PROTECTIVE SIGNALING SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (UJRQ)

USE

This category covers visual-signal devices such as rotating beacons and strobe lights that have been investigated for fire protective signaling or other emergency visual signaling. Visual signaling devices are intended for use with Listed compatible fire alarm control units or control unit accessories.

Accessories, such as enclosures and back boxes, and the products with which they are compatible are identified in the individual Listing information.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual Listing information. Marking on each part references installation instructions which show assembly and installation of the parts to form a Listed product.

All products in this category are intended for indoor use only unless otherwise specifically marked. Devices have been investigated for light output measured at a distance of 10 ft. on-axis. The units are marked with a range of light output and flash rate.

Visual-signal devices Listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazard-

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ous locations have been tested for dust-tightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts and also to establish that they will function as intended with dust accumulated on external parts.

For additional information, see Equipment for Use In and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 1638, "Visual Signal Appliances - Private Mode Emergency & General Utility Signaling."

The basic hazardous location standards used to investigate products in the category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Fire Protective Visual Signaling Appliance for Use in Hazardous Locations," "Emergency Visual Signaling Appliance for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listing.

VISUAL-SIGNAL DEVICES FOR USE IN HAZARDOUS LOCATIONS (UJTK)

GENERAL

This category covers visual-signal devices such as rotating beacons and strobe lights for use in general signal applications, and subassemblies of visual-signal devices intended for final assembly into visual-signal devices.

Subassemblies, such as mounting bodies, globes and guards, and the products with which they are compatible are identified in the individual Listings.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual Listings. Marking on each part references installation instructions which show assembly and installation of the parts to form a Listed product.

Visual-signal devices Listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been tested for dust-tightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts and also to establish that they will function as intended with dust accumulated on external parts.

RELATED PRODUCTS

Devices intended for use in fire alarm and/or emergency protective signaling applications are covered under Visual-Signal Devices for Fire Protective Signaling Systems for Use in Hazardous Locations (UJRQ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1638, "Visual Signaling Appliances - Private Mode Emergency and General Utility Signaling."

The basic hazardous (classified) locations standards used to investigate products in the category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Visual-Signal Appliance for Use in Hazardous Locations" or "Visual-Signal Appliance Subassembly for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

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SIGNALING APPLIANCES AND EQUIPMENT FOR THE HEARING IMPAIRED FOR USE IN HAZARDOUS LOCATIONS (UXWC)

GENERAL

This category covers visual-signaling appliances, vibrators or other sensory apparatus and associated equipment that has been investigated for fire protective signaling services to alert hearing-impaired persons, and subassemblies of signaling appliances intended for final assembly into signaling appliances.

Subassemblies, such as mounting bodies, globes and guards, and the products with which they are compatible are identified in the individual Listings.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual Listings. Marking on each part references installation instructions that show assembly and installation of the parts to form a Listed product.

These signaling appliances are intended to be used in conjunction with Listed compatible fire alarm control units, alarm initiating devices and the like. The interconnection, use and installation requirements of the products are intended to be in accordance with NFPA 72, "National Fire Alarm Code."

Visual-signaling appliances covered under this category are intended to be used in the "Public Operating Mode" as defined in NFPA 72. Visual-signaling appliances intended to be used in the "Private Mode" are covered under Visual-Signal Devices for Use in Hazardous Locations (UJTK) and Visual-Signal Devices for Fire Protective Signaling Systems for Use in Hazardous Locations (UJRQ).

The signaling appliances in this category have been investigated as to their ability to alert most hearing-impaired persons. However, since the ability of signal recognition varies among individuals, the effectiveness of alerting a person can only be ensured by actual testing of that person with the installed signaling appliance.

This category does not cover signaling devices for the hearing impaired that are an integral part of other alarm initiating or indicating devices. When such a combination exists, suitability as a signaling appliance for the hearing impaired will be noted in the Listings of the primary product. Refer to Audible-Signal Devices for Use in Hazardous Locations (UGKZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1971, "Signaling Devices for the Hearing Impaired."

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Signaling Appliance for the Hearing Impaired for Use in Hazardous Locations," "Signaling Appliance Accessory for the Hearing Impaired for Use in Hazardous Locations," "Signaling Appliance Subassembly for the Hearing Impaired for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS (VAPT)

USE

This category covers solenoids for connection to threaded rigid conduit. The solenoids are incomplete devices inasmuch as the plungers or pistons are intended to actuate an external valve or other equipment. This category covers the solenoid only and not the valve or other equipment to which the solenoids are mounted.

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For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 429, "Electrically Operated Valves" and UL 1002, "Electrically Operated Valves for Use in Hazardous Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Solenoid for Use in Hazardous Locations."

SOLENOID PUMPS FOR USE IN HAZARDOUS LOCATIONS (VAWS)

GENERAL

This category covers solenoid pumps for connection to threaded rigid conduit. The solenoid pumps are complete devices intended to actuate an external metering device or other equipment. These category covers the solenoid pump only and not the metering device or other equipment to which the solenoid pumps are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1002, "Electrically Operated Valves for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word "LISTED," a control number, and the product name "Solenoid Pump for Use in Hazardous Locations."

SOLVENT DISTILLATION UNITS FOR USE IN HAZARDOUS LOCATIONS (VBFY)

This category covers solvent distillation units with a maximum capacity of 60 gal (227 l) which are intended to recycle non-flammable, flammable or combustible solvents. These units have only been investigated for use with the solvent(s) indicated in the instruction manual provided with the unit. In addition, these units will be marked to indicate the solvent(s) or with a statement referencing the instruction manual.

The basic standard used to investigate products in this category is UL 2208, "Solvent Distillation Units". UL 2208 makes reference to UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations", UL 1203, "Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL 1604, "Standard for Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations", UL 674, "Standard for Electric Motors and Generators for Use in Hazardous (Classified) Locations", UL 698, "Standard for Industrial Control Equipment for Use in Hazardous (Classified) Locations", UL 823, "Standard for Electric Heaters for Use in Hazardous (Classified) Locations", UL 886, "Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations", UL 894, "Standard for Switches for Use in Hazardous (Classified) Locations", and UL 1002, "Standard for Electrically Operated Valves for Use in Hazardous (Classified) Locations", as appropriate.

The equipment covered by this category is intended for installation and use in accordance with the National Electrical Code, NFPA 70, the Flammable and Combustible Liquids Code, NFPA 30, and the Uniform Fire Code, published by the International Fire Code Institute.

This Listing does not cover carbon-bed units, units which are intended to be installed outdoors, units which are intended to distill solvents containing nitrocellulose or other unstable reactives, and units intended for high volume distillation processes typical of the petrochemical or distilled spirits industries.

The storage, use and disposal of any flammable or combustible solvents and hazardous materials used with or produced by the equipment, the physiological effects of these solvents and hazardous wastes, and the purity of the recycled solvent have not been investigated by Underwriters Laboratories Inc. and are not covered by the listing.

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Solvent Distillation Unit for Use in Hazardous Locations", or equivalent.

SOUND METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VBYC)

GENERAL

This category covers equipment that measures and stores the ambient noise levels in industrial areas.

RELATED PRODUCTS

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations," UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations" and UL 508, "Industrial Control Equipment," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Noise Dosimeter" or "Sound Level Meter," or other appropriate product name as shown in the individual Listings.

SOUND RECORDING AND REPRODUCING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VCSV)

USE

This category covers devices such as speakers and similar equipment for use in sound recording or reproducing systems.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sound Recording Equipment for Use in Hazardous Locations" or "Sound Reproducing Equipment for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

SPRINKLER SYSTEM AND WATER SPRAY SYSTEM DEVICES FOR USE IN HAZARDOUS LOCATIONS (VQNT)

These listings cover devices and equipment for use in sprinkler systems and water spray systems.

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These devices and equipment should be installed in compliance with the Standards of National Fire Protection Association, NFPA No. 13 for Sprinkler Systems, NFPA No. 15 for Water Spray Systems for Fire Protection, and NFPA No. 16 for Foam-Water Sprinkler and Spray Systems. Inspection authorities having jurisdiction should be consulted regarding use of these listed devices and equipment before installation.

These systems also appear under "Sprinkler Systems and Water Spray System Devices" in the Laboratories' Fire Protection Equipment List.

SPECIAL SYSTEM WATER CONTROL VALVES AND SYSTEM ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (VQRZ)

Class I - See description of devices in this grouping on Guide Card VQWV.

Special System Water Controller Valves, Class I, for Use in Hazardous Locations System Water Controller (VQWV)

These valves are intended for use in controlling water flow to sprinkler and water spray systems. Unless otherwise stated, deluge valves are to be installed in the vertical position only.

These devices and equipment are intended to be installed in compliance with the Standards of National Fire Protection Association, for the installation of Sprinkler Systems, NFPA No. 13, for Water Spray Fixed Systems, NFPA No. 15 or for Foam - Water Sprinkler and Foam-Water Spray Systems, NFPA No. 16. Inspection authorities having jurisdiction should be consulted regarding use of these Listed devices and equipment before installation.

The basic standard used to investigate products in this category is UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Deluge Valve for Use in Hazardous Locations."

SWITCHES, PRESSURE FOR USE IN HAZARDOUS LOCATIONS (VRBR)

USE

This category covers pressure-operated switches for use in connection with sprinkler equipment, water spray systems and like protection systems, as a means of initiating electrical alarms upon flow of water in the equipment or for actuation of other auxiliary equipment.

ADDITIONAL INFORMATION

For additional information, see Sprinkler System and Water Spray System Devices for Use in Hazardous Locations (VQNT) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pressure Switch for Use in Hazardous Locations."

STATIC ELECTRICITY DETECTORS FOR USE IN HAZARDOUS LOCATIONS (VWJR)

This category includes portable electronic instruments for detecting electrostatic charges in hospital operating rooms and other locations where static electrical charges may be a hazard.

The basic standard used to investigate products in this category is UL913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations" .

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its

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Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Static Electricity Detector for Use in Hazardous Locations" .

STATIC NEUTRALIZING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VXDY)

This category covers high voltage power units and discharge bars designed for individual installation on equipment in hazardous locations where static charges are generated during operation.

Due to the nature of these installations, high voltage parts are necessarily exposed and cannot be completely shielded from contact.

Care should be taken to follow the instructions provided with the equipment regarding the installation of the static neutralizers, including proper grounding of the equipment, and operating personnel should be carefully instructed regarding its correct operation and maintenance.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Static Neutralizing Equipment for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

STRAPS, RESTRAINT, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (VZAR)

These restraint straps made from electrically conductive natural or synthetic rubber are intended for use in hospital operating rooms where accumulation of charges of static electricity presents a hazard due to the possibility of static sparks being formed in the presence of flammable anesthetic-air mixtures.

Tests indicate that these restraint straps in lengths used in hospital operating rooms are sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

The basic standard used to investigate products in this category is UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations" .

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Restraint Straps Relating to Hazardous Locations" .

SURGE PROTECTORS AND ISOLATORS FOR USE ON CATHODICALLY PROTECTED SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (VZQO)

GENERAL

This category covers surge protectors and isolators used to provide AC grounding and DC blocking for cathodic protection of underground pipelines and similar installations in hazardous locations. They may also be used to minimize galvanic corrosion between structures of dissimilar metals.

These devices have been investigated for providing effective grounding path characteristics as noted in the 1999 National Electrical Code, Section 250-2(d). Additionally, these devices have been investigated for providing isolation of objectionable DC ground currents as noted in the 1999 National Electrical Code Section 250-6(e). Manufacturers of these devices provide installation instructions and maintenance information to assure proper installation and continuous protection of the equipment.

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ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Surge Protector for Use in Hazardous Locations," "Overvoltage Protector for Use in Hazardous Locations," "Polarization Cell Replacement Unit for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WQNV)

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

SWITCHES, CLOCK-OPERATED FOR USE IN HAZARDOUS LOCATIONS (WRBT)

Clock-operated switches listed with horsepower ratings are tested at rated voltage and at six times motor full load running current for ac ratings and at ten times motor full load running current for dc ratings.

Clock-operated switches listed with pilot duty ratings are intended for control of electromagnetic loads, such as a solenoid of a motor controller or electrically operated valve, and are tested with an appropriate electromagnetic load.

The basic standard used to investigate products in this category is UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment For Use In Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clock Operated Switch (or other appropriate product name) for Use in Hazardous Locations".

ENCLOSED SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WRPR)

This category covers enclosed switches either with or without fuse holders for plug or cartridge fuses.

Ratings of listed enclosed switches for hazardous locations are limited to 3600 amp, 500 hp, 600 v.

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp rating are intended for general use.

Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less, and the use of 75 C wire for higher amp rated circuits.

Enclosed motor circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Switch For Hazardous Locations".

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SNAP SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WSQX)

Snap switches are limited in ratings to 30 amp, 600 v, ac; 60 amp, 250 v, ac or dc; and not more than 2 hp at 600 v or less, ac, 250 v or less, dc.

Snap switches with horsepower ratings have been tested with respect to interruption of maximum overload currents of motors of the same horsepower and voltage ratings.

Snap switches having a "T" rating are capable of controlling tungsten filament lamp loads corresponding to the 125 v rating of the switches.

Snap switches provided with a factory seal of conductors entering the switch enclosure are so identified by a marking on the product.

The basic standard used to investigate products in this category is UL894, "Switches for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name Snap Switch for Use in Hazardous Locations".

SWITCHES, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (WTEV)

Switches in this category are not fused. The suitability of miscellaneous switches for use on high capacity circuits has not been investigated.

Miscellaneous switches with amp ratings are intended for general use.

Switches with horsepower ratings are suitable for use in motor circuits.

Miscellaneous switches Listed with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for a-c ratings and at four times motor full load running current for d-c ratings.

The basic standard used to investigate products in this category is UL698, "Industrial Control Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Flow Switch for Use in Hazardous Locations", "Limit Switch for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

TANK MONITORING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (WWQS)

This category covers tank monitoring equipment, including control units, indicators, sensors, transmitters, liquid level probes and auxiliary devices used for tank monitoring or as part of tank monitoring systems.

Certain products in this category are associated apparatus and are intended for installation in nonhazardous locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III Division 1, Hazardous Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Tank Monitoring Equipment for Use in Hazardous Locations", "Tank Monitoring Equipment (Associated Apparatus)", or other appropriate product name as shown in the individual Listing.

TELEMETERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (WYMV)

GENERAL

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This category covers telemetering transmitter coil assemblies, small generators, pulse generators, fluid flow indicators and meters, transmitter and receiver units employing selsyn motors, and similar equipment.

Investigation of telemetering equipment marked "Rain tight" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Telemetering equipment provided with a factory seal of conductors entering the device enclosure is so identified on the product.

Products that have also been investigated in accordance with IEC 60079-11, "Part 11: Construction and Test of Intrinsically Safe and Associated Apparatus" are identified with the IEC marking on the product and in the individual Listings.

RELATED PRODUCTS

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Telemetering Equipment for Use in Hazardous Locations," "Section of Telemetering Equipment for Use in Hazardous Locations," "Telemetering Equipment Relating to Hazardous Locations" or "Section of Telemetering Equipment Relating to Hazardous Locations," an appropriate abbreviation, or other appropriate product name as shown in the individual Listings.

TELEMETERING EQUIPMENT ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (WYOS)

These products are retrofit devices or kits consisting of parts and/or subassemblies intended for field installation in UL Listed Telemetering Equipment. These products have been evaluated by UL to determine that when used in accordance with the manufacturer's instructions they do not adversely affect the operation of the complete unit.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment," UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations," UL 1203, "Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification Marking includes: (1) the UL symbol; (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory); (3) the product identity; (4) "FOR USE WITH (identification of specified product)"; and (5) a control number.

TELEPHONES FOR USE IN HAZARDOUS LOCATIONS (WZAT)

USE AND INSTALLATION

This category covers telephones, sound powered telephones, and communication equipment and systems. Unless identified as intrinsically safe or for use in Division 2 locations only, the equipment is of the explosion-proof design.

The hand set and cord assembly should be carefully inspected and should be replaced if there is any evidence of damage or deterioration.

The equipment should be installed in accordance with the installation instructions provided with the product and in accordance with NFPA 70, "National Electrical Code."

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Station equipment, power supply equipment, protectors, and other equipment as detailed in the installation instructions should be located outside the hazardous area.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

TELEPHONE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (WZOR)

USE

This category covers dialing units, push-button stations, relays, snap switches, and also conduit boxes having terminal blocks for connection to telephone sets.

ADDITIONAL INFORMATION

For additional information, see Telephones for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone Accessory for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

TEMPERATURE-INDICATING AND REGULATING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (XBDV)

Temperature-indicating and regulating equipment is listed with a maximum rating of 600 v.

These listings cover electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control, or equipment or appliance operation, etc.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in "pilot duty" is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75-80 per cent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

The listings of motor operators do not include valves or other connected mechanical loads.

The Thermostats in the following listings can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

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Equipment marked "rain tight" has been subjected to tests designed to simulate exposure to a beating rain to determine that such exposure will not result in entrance of water.

The basic standards used to investigate products in this category are UL873, "Temperature-Indicating and -Regulating Equipment" and UL1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Thermostat for Use in Hazardous Locations," "Temperature-Indicating Equipment for Use in Hazardous Locations," "Temperature-Indicating Equipment (Associated Apparatus)" or other appropriate product name as shown in the individual Listing.

TIME-INDICATING AND RECORDING APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (XIAZ)

Electric clocks and chart drivers are included under this category.

The basic standards used to investigate products in this category are UL1203, "Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL913, "Intrinsically Safe Apparatus and Associated Apparatus for use Class I, II and III Division 1, Hazardous Locations", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Clock for Use in Hazardous Locations" or other appropriate product name.

TIRES, ELECTRICALLY CONDUCTIVE RUBBER, INDUSTRIAL, RELATING TO HAZARDOUS LOCATIONS (XJCV)

These solid industrial tires are made of electrically conductive rubber specially developed and compounded to have an electrical conductivity adequate to dissipate static electricity readily. The conductive rubber tires are vulcanized to metal rims or wheels. They are intended for use on industrial trucks which may be operated in hazardous locations where static sparks would introduce a fire and explosion hazard.

In order for static charges to pass from equipment fitted with the tires, it is necessary that the various parts of the equipment be conductive, and electrically connected together, and that the equipment be operated on an adequately conductive surface or flooring. (See listings under classification, flooring, electrically conductive).

Liquid gasoline and oil are injurious to rubber compounds, and impair the electrically conductive properties of these tires. Accordingly, contact of the tires with liquid gasoline or oil, and the use of floor oils and oily sweeping compounds, should be avoided. Insulating floor waxes should not be used.

The basic standards used to investigate products in this category are UL583, "Electric Battery Powered Industrial Trucks" and UL1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Rubber Industrial Tire Relating to Hazardous Locations".

TRANSFORMERS FOR USE IN HAZARDOUS LOCATIONS (XPAF)

TRANSFORMERS, GENERAL PURPOSE FOR USE IN HAZARDOUS LOCATIONS (XPJF) GENERAL

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This category covers transformers of the compound filled, exposed core or open core and coil construction (industrial control type) type, rated 600 V or less. Step-up, step-down, insulated, and autotransformer types as well as air cooled reactors are included. Autotransformers are so marked.

These transformers have been evaluated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present such as that which may occur with uninterruptible power supplies, data processing equipment and solid state motor speed controllers.

General purpose transformers are provided with leads, or with studs or terminal pads to which Listed pressure wire connectors can be factory or field installed to accommodate field wiring. Wire binding screws or studs with cupped washers may be used for copper wire 10 AWG max.

PRODUCT MARKINGS

A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode, as appropriate. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references as to where further connection detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to total load kVA. Elevated voltage is that situation in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding.

Some transformers are marked to specify a minimum distance to a wall.

Unless the equipment is marked otherwise, termination provisions are based on the use of 60°C wire for size 14-1 AWG and 75°C wire for size 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of NFPA 70, "National Electrical Code" must be observed in installations or use, suitable special instructions are marked on the transformer.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," UL 506, "Specialty Transformers" and UL 1012, "Power Units Other Than Class 2."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "General Purpose Transformer for Use in Hazardous Locations," "Industrial Control Transformer for Use in Hazardous Locations," "Air Cooled Reactor for Use in Hazardous Locations," "Auto-Transformer for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings. The word Transformer may be abbreviated "XFMR," "XFRMR" or "XFORMER."

TRANSFORMERS, DISTRIBUTION, LIQUID- FILLED TYPE, OVER 600 V FOR USE IN HAZARDOUS LOCATIONS (XPLP)

USE

This category covers liquid-filled, distribution type, pad-mounted and substation type transformers, 69 kV class or less, single- and three-phase.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

The transformers may be provided with fan cooling accessories. The use of a fan cooling accessory permits the transformer to experience temporary overloads without exceeding the maximum temperature rating of the transformer insulation system. Transformers equipped with a fan cooling accessory are marked to indicate that they must be connected to an attended annunciator device and that provision must be made for automatic load shedding in the event of overtemperature.

The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS Sheets) available from the transformer manufacturer.

These transformers are intended for installation in accordance with the requirements of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is IEEE C57.12.00-1987, "Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers." Additional standards used to investigate pad-mounted

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types are ANSI C57.12.22-1989, "Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 kVA and Smaller: High Voltage, 34,500 Grd/19,920 Volts and Below; Low-Voltage, 480 Volts and Below - Requirements," ANSI C57.12.26-1993, "Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, 34,500 Grd/19,920 Volts and Below; 2500 kVA and Smaller" and ANSI C57.12.28-1999, "Standard for Switchgear and Transformers, Pad-Mounted Equipment - Enclosure Integrity." Additional requirements used to investigate substation-type are contained in ANSI C57.12.13-1992, "Conformance Requirements for Liquid-Filled Transformers Used in Unit Installations, Including Unit Substations," as appropriate.

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Liquid-Filled Distribution Transformer for Use in Hazardous Locations." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

TRANSFORMERS FOR USE IN HAZARDOUS LOCATIONS (XUAN)

GENERAL

This category covers transformers of the compound filled, exposed core or open core and coil construction (industrial control type) type, rated 600 V or less. Step-up, step-down, insulated, and autotransformer types as well as air cooled reactors are included. Autotransformers are so marked.

These transformers have been evaluated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present such as that which may occur with uninterruptible power supplies, data processing equipment and solid state motor speed controllers.

General purpose transformers are provided with leads, or with studs or terminal pads to which Listed pressure wire connectors can be factory or field installed to accommodate field wiring. Wire binding screws or studs with cupped washers may be used for copper wire 10 AWG max.

PRODUCT MARKINGS

A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode, as appropriate. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references as to where further connection detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to total load kVA. Elevated voltage is that situation in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding.

Some transformers are marked to specify a minimum distance to a wall.

Unless the equipment is marked otherwise, termination provisions are based on the use of 60°C wire for size 14-1 AWG and 75°C wire for size 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of NFPA 70, "National Electrical Code" must be observed in installations or use, suitable special instructions are marked on the transformer.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," UL 506, "Specialty Transformers" and UL 1012, "Power Units Other Than Class 2."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "General Purpose Transformer for Use in Haz-

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ardous Locations," "Industrial Control Transformer for Use in Hazardous Locations," "Air Cooled Reactor for Use in Hazardous Locations," "Auto-Transformer for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings. The word Transformer may be abbreviated "XFMR," "XFRMR" or "XFORMER."

TRUCKS, INDUSTRIAL FOR USE IN HAZARDOUS LOCATIONS (XVHY)

Powered industrial trucks include fork trucks, tractors, motorized hand trucks, platform trucks, towing tractors and other specialized types powered by electric motors or internal combustion engines.

They have been classified with regard to specific hazards as indicated in the General Information for each of the following categories.

Except for compressed natural gas fueled industrial trucks, they are intended for use in accordance with the Standard of the National Fire Protection Association for type designations, areas of use, maintenance, and operation of Powered Industrial Trucks, NFPA No. 505. Compressed natural gas fueled industrial trucks are for use in designated areas where they have been judged acceptable by the Authority Having Jurisdiction.

TRUCKS, INDUSTRIAL, TYPE EX FOR USE IN HAZARDOUS LOCATIONS (XXGV)

GENERAL

This category covers electric battery powered trucks provided with safeguards against fire, electric shock, and explosion hazards. The trucks are intended to be used in hazardous (classified) locations.

Electrical equipment for use in Class I hazardous locations, as defined in NFPA 70, "National Electrical Code" (NEC), is tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air, as follows:

Class I, Group D — Atmospheres containing acetic acid (glacial) acetone, acrylonitrile, ammonia, benzene, butane, 1-butanol (butyl alcohol), 2-butanol (secondary butyl alcohol), n-butyl acetate, isobutyl acetate, sec-butyl alcohol, diisobutylene ethane, ethanol (ethyl alcohol), ethyl acetate, ethyl acrylate (inhibited), ethylene diamine (anhydrous), ethylene dichloride, gasoline, heptanes, hexanes, isoprene, isopropyl ether, mesityl oxide, methane (natural gas), methanol (methyl alcohol), 3-methyl-1-butanol (isoamyl alcohol), methyl ethyl ketone, methyl isobutyl ketone, 2-methyl-1-propanol (isobutyl alcohol), 2-methyl-2-propanol (tertiary butyl alcohol), petroleum naphtha, pyridine octanes, pentane, 1-pentanol (amyl alcohol), propane, 1-propanol (propyl alcohol), 2-propanol (isopropyl alcohol), propylene, styrene, toluene, vinyl acetate, vinyl chloride or xylenes.

Dust-ignition-proof electrical equipment for use in Class II hazardous locations, as defined in the NEC, is tested with respect to safety of operation in the presence of combustible dusts in air, as follows:

Class II, Group G — Atmospheres containing flour, starch, or grain dusts.

Explosion-proof types of devices classified for use in Class I locations are not necessarily acceptable for Class II locations as they may not be dusttight or operate at a safe temperature when blanketed with dust.

Equipment classified for Class II, Group G hazardous locations is also suitable for use in Class III locations, except fan cooled type motors where there is a very large amount of lint or combustible flyings which are liable to choke or clog the air passage of the motor.

Class III locations are defined in the NEC as those which are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in air in quantities sufficient to produce ignitable mixtures.

Unless otherwise indicated, equipment classified for one or more of the hazardous location groups is suitable for use in Divisions 1 and 2 locations as defined in the NEC and in unclassified (ordinary) locations.

Safety of use in hazardous locations will be endangered should openings or other alterations be made in the devices. Holding bolts of enclosing cases and threaded parts must be screwed tight. Continued safety of installation will depend upon proper maintenance. Unless otherwise indicated, this category applies to the equipment where used indoors where severe corrosive conditions are not likely to be present.

These trucks and tractors are provided with safeguards to reduce the possibility of ignition of hazardous atmospheres by mechanical or friction sparks. Since such sparks can also be generated by the parts handled, pushed or towed by the classified equipment, suitable precautions should be taken to reduce the possibility of such sparks.

This category includes electrical industrial riding or walking type lift trucks, platform trucks, towing tractors, etc. with storage battery as the source of power. This category does not include hauled or towed attachments or equipment which is not a part of the truck or tractor.

Classified storage batteries specified by the electric truck manufacturers should be used with the trucks. The batteries are each provided with a receptacle and plug interlocked with a switch which does not permit

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insertion or withdrawal of the plug unless the switch is in the "off" position, or a receptacle with provision for locking the plug in the receptacle to deter removal by unauthorized persons. Normal level of electrolyte should be maintained at all times and proper fuses used in battery fuse enclosure.

At least two of the wheels on these trucks are electrically conductive. Liquid gasoline and oil is injurious to rubber compounds and impairs the electrically conductive properties of the tires. The use of floor oils and oily sweeping compounds should be avoided.

ADDITIONAL INFORMATION

For additional information, see Trucks, Industrial for Use in Hazardous Locations (XVHY) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 583, "Electric Battery Powered Industrial Trucks."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**AS TO FIRE, ELECTRIC SHOCK, AND EXPLOSION HAZARDS —
CLASS ____ GROUP ____, HAZARDOUS LOCATIONS ONLY
TYPE EX INDUSTRIAL TRUCK**

**STORAGE BATTERIES, TRUCKS,
ELECTRIC FOR USE IN HAZARDOUS
LOCATIONS (XXIY)**

These are storage batteries for use with Type EX industrial trucks. They are provided with explosion-proof and/or dust-ignition-proof fuse enclosure and interlock switches to prevent insertion or withdrawal of the battery cable plug under load.

The basic standard used to investigate products in this category is UL 583, "Electric Battery Powered Industrial Trucks."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify Storage Batteries which have been produced under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
AS TO FIRE, ELECTRIC SHOCK, AND EXPLOSION HAZARDS ONLY.
CLASS ____ GROUP ____, HAZARDOUS
LOCATIONS. ELECTRIC TRUCK STORAGE BATTERY.**

**TUBING AND HOSE, ELECTRICALLY
CONDUCTIVE, RELATING TO
HAZARDOUS LOCATIONS (YDGT)**

This category includes tubing and reinforced hose of electrically conductive plastic or natural or synthetic rubber for conveying gases or vapors in flammable anesthetizing locations where it is necessary for safety to avoid accumulation of static electricity. Unless otherwise indicated with the product they are for use with air of anesthetic-air mixtures at comparatively low pressure.

Tests indicate that this tubing and hose in lengths used in flammable anesthetizing locations is sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.

The basic standard used to investigate products in this category is UL 1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electrically Conductive Hose Relating to Hazardous Locations" or "Electrically Conductive Tubing Relating to Hazardous Locations".

**VALVES, ELECTRIC FOR USE IN
HAZARDOUS LOCATIONS (YTSX)**

These are electrically operated valves, which for the purpose of listing, are designated as General Purpose Valves or as Safety Valves. Such valves

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that may be equipped with complementary or optional mechanical actuators are also included in this classification.

A General Purpose Valve is one intended to control the flow of a fluid, but is not to be depended upon to act as a safety valve. It may be a normally closed or normally open valve. (Such valves were designated Regulating Valves heretofore).

A Safety Valve is a normally closed valve of the "On" and "Off" type intended to be actuated by a safety control or an emergency device to prevent the unsafe delivery of a fluid. It may also be used as a general purpose valve. (Such valves were designated Shut-Off Valves heretofore). A multiple port valve may be designated as a Safety Valve only with respect to its normally closed port.

Unless otherwise indicated, these valves are for connection to rigid conduit in an ambient temperature normally prevailing in habitable spaces and for handling fluids at a temperature not exceeding 25 C (77 F).

Identification of the specific fluid(s) for which the valve is Listed, along with the fluid temperature and ambient temperature ratings, is (1) included in installation instructions, (2) shown on the smallest carton in which the valve is packaged, or (3) marked on the valve or on a tag attached to the valve.

The basic standard used to investigate products in this category is UL 1002, "Electrically Operated Valves for Use in Hazardous Locations, Class I, Groups A, B, C, and D, Class II, Groups E, F, and G".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "General Purpose Valve for Hazardous Locations" or "Safety Valve for Hazardous Locations".

**VENTILATORS, POWER FOR USE IN
HAZARDOUS LOCATIONS (ZANE)**

This category covers roof and wall mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof and wall mounted power ventilators have a weather resistant housing and are supported by a weather resistant base intended to fit, usually by means of a curb, over a wall or roof opening.

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

These ventilators are intended for industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust type and makeup air type devices. Makeup air type ventilators are not equipped for evaporative cooling.

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with Authorities Having Jurisdiction.

These ventilators are not intended for the primary removal of grease-laden vapors and residues over restaurant appliances.

Metallic impellers are constructed of medium brass or aluminum, with a hardness not over Rockwell B66. Belt-driven power ventilators are evaluated for the potential risk of ignition from temperature as a result of belt slippage.

Equipment in this category consists of an assembly of UL Listed, Classified and Recognized parts for use in hazardous locations. The basic standards used to investigate equipment in this category are the applicable hazardous locations standards for the parts of the assembly and UL 705, "Power Ventilators".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Power Ventilator for Use in Hazardous Locations", or other appropriate product name as shown in the individual Listing.

**ELECTRICAL INDUSTRIAL
VIBRATORS FOR USE IN
HAZARDOUS LOCATIONS (ZBRX)**

USE AND INSTALLATION

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This category covers devices designed to produce controlled vibration by electromagnetic means or motor rotor eccentrics, and that have provisions for mounting to impart the vibrating motion to industrial material handling equipment such as sieves and hoppers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Industrial Vibrator for Hazardous Locations," "Industrial Vibrator for Hazardous Locations" or "Industrial Vibrator-Motor for Hazardous Locations."

VISCOMETERS FOR USE IN HAZARDOUS LOCATIONS (ZCFV)

USE AND INSTALLATION

This category covers portable instruments for determining viscosities of fluids in locations where specified flammable gases or vapors may be present.

The flexible cord connected to the units should be frequently inspected and replaced when necessary.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

UNEVALUATED FACTORS

The use and reliability of these devices for measuring viscosities of fluids have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations," UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations" and UL 1604, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

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UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Viscometer for Use in Hazardous Locations."

X-RAY EQUIPMENT ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (ZRBZ)

This listing covers accessory X-ray apparatus, such as X-ray film viewers and illuminators which do not affect the emission of X-radiation and are used exclusively for the examination and handling of processed X-ray film.

The X-ray film illuminators are intended for direct connection to threaded rigid conduit. These illuminators should be used only where not subject to breakage.

The X-ray film illuminators are designed to operate without causing ignition of surrounding flammable gas or vapor-air atmospheres covered by the group under which they are listed. The illuminators are provided with seals between lamp chambers and wiring chambers for supply line connections.

The X-ray film illuminators should be disconnected from the supplying circuits before disassembly or relamping and should be tightly reassembled before connecting circuits.

Film illuminators intended for recessed installations are so indicated in the listings. Recessed film illuminators unless marked as described in the following paragraph, are intended to be installed with the recessed portions of the enclosure, other than points of support, spaced at least 1/2 in. from combustible material.

Recessed film illuminators which are intended for installation in fire-resistive constructions only are marked: "This fixture is suitable for installation only in buildings of fire-resistive construction, where the fixture is not mounted on or adjacent to combustible materials."

The maximum ratings of the listed devices are specified in volts and watts or amps.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "X-Ray Equipment Accessory for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

2003 General Information from Hazardous Locations Equipment Directory - Part II

PART III

Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ)

I. GENERAL

Part II of this directory includes electrical equipment intended for use in and relating to Class I, Zone 0, 1 and 2 hazardous locations. This equipment has been evaluated for installation in accordance with Article 505 of NFPA 70, "National Electrical Code" (NEC). See **Part I** for electrical equipment intended for use in Class I, II and III, Division 1 and 2 hazardous locations.

Unless equipment is identified in 1) the product category title as relating to Class I, Zone 0, 1 and 2 hazardous locations or 2) the individual Listing as apparatus for use in unclassified (ordinary) locations, all product categories contain electrical equipment for use in Class I, Zone 0, 1 and 2 hazardous locations.

The Listings and Classifications pertain to equipment which has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC. Attention is called to the limitations of the Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Electrical equipment for unclassified (ordinary) locations is covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory.

Equipment for unclassified (ordinary) locations is covered in UL's other product directories.

III. HAZARDOUS LOCATIONS – GENERAL INFORMATION

Class I hazardous locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors, or flammable liquids. This part of the directory includes equipment that has been specifically evaluated for hazardous locations which are identified by a single Class (Class I) that is divided into Zones (0, 1 and 2) and gas Groups (IIA, IIB and IIC), as described in Article 505 of the NEC. Essentially, if the location has a flammable or combustible atmosphere present continuously or for long periods of time, it is a Zone 0 location. If the atmosphere is flammable or combustible and likely to exist under normal conditions, it is a Zone 1 location. If the atmosphere of flammable or combustible gases or vapors is not likely to exist in normal operation, it is a Zone 2 location.

Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Class, Zone and Groups for which equipment has been Listed or Classified is shown in the individual Listings and Classifications under the respective categories and is marked on the equipment itself.

Suitability of Listed or Classified Equipment

Equipment marked for use in or relating to Class I, Zone 0 areas is also suitable for Zone 1 and 2 areas of the same gas group and with similar temperature class, and in unclassified locations. Equipment marked for use in or relating to Class I, Zone 1 areas is also suitable for use in or relating to Class I, Zone 2 areas of the same gas group with similar temperature class and in unclassified locations. Equipment marked for use in or relating to Class I, Zone 2 areas is suitable only for use in or relating to those areas classified as Class I, Zone 2 and in unclassified locations. In addition, the NEC states that equipment that is Listed for Zone 0, 1 or 2 is permitted in a Class I, Division 2 area of the same gas group and with a suitable temperature class.

Protection Techniques

Equipment for use in Class I, Zone 0, 1 or 2 locations may employ one or more of the following protection techniques:

Area Classification	Protection Technique	Protection Technique Identification
Zone 0	Intrinsically Safe (2 fault)	ia
Zone 1	Intrinsically Safe (1 fault)	ib
	Flameproof	d
	Purged and Pressurized	p
	Oil Immersion	o
	Increased Safety	e
	Encapsulation	m

AreaClassification	ProtectionTechnique	Protection TechniqueIdentification
Zone 2	Powder Filling	q
	Non-sparking	nA
	Sparkling with Protected Contacts	nC
	Restricted Breathing	nR
Unclassified	Associated Apparatus with I.S.Connections for Zone 0 (2 fault)	[ia]
	Associated Apparatus with I.S.Connections for Zone 1 (1 fault)	[ib]

Intrinsically Safe — Equipment in which any spark or thermal effect produced under normal or fault conditions is incapable of causing ignition of the atmosphere. See “Intrinsically Safe Circuits and Apparatus, and Associated Apparatus” below for more information.

Flameproof — The enclosure of the equipment will withstand an internal explosion, and prevent passage of flame to the surrounding atmosphere. Care must be taken to maintain the length and clearance (gap) of flameproof joints in service.

Purged and Pressurized — A protective inert gas is maintained inside the equipment enclosure at a pressure above that of the surrounding atmosphere, in order to prevent ingress of the explosive gas or vapor.

Oil Immersion — Arcing contacts are immersed in a protective liquid.

Increased Safety — The equipment contains no normally arcing parts, and additional measures (such as larger spacings between wiring connections) are taken to prevent the possibility of high temperatures or sparks. A minimum IP rating of IP 54 is required.

Encapsulation — Arcing contacts are completely surrounded by an encapsulating material.

Powder Filling — Arcing contacts are surrounded by a filling material (glass or quartz powder).

Non-sparking — The equipment has no normally arcing parts or thermal effects capable of ignition.

Sparkling with Protected Contacts — Arcing contacts are in nonincendive circuits, or are inside a hermetically sealed container or sealed device.

Restricted Breathing — The enclosure relies on tight seals and gaskets to prevent diffusion of the explosive atmosphere into the equipment enclosure. Provision for checking that the restricted breathing properties of the enclosure are maintained is provided.

The one- or two-letter identification of the protection technique is marked on the product. Products employing multiple protection techniques will be marked with all applicable identifications. A control station containing a flameproof switch and an encapsulated pilot light, mounted in an increased safety enclosure, would be marked with all three protection techniques “edm.”

Environmental Considerations

Unless the equipment is marked otherwise, it is to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions will be marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See “Enclosure Considerations for All Equipment” below for more information.

Ambient Temperatures

Unless the equipment is marked otherwise it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -20°C (-4°F) to +40°C (+104°F). Use of flameproof equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within the equipment. Plastic parts of enclosures or encapsulating materials may not maintain their integrity in excessively high or low ambient, unless marked otherwise.

Overload Protection

Equipment should be installed in circuits with overload and short-circuit protection for established ratings. The ampere or wattage marking on power consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Enclosure Modification and Maintenance

The integrity of an enclosure must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of a flameproof enclosure to contain an explosion. Most other protection techniques require a minimum IP rating and alterations in the enclosure may impair the enclosure’s ability to protect against ingress of contaminants or water. See “Enclosure Considerations for All Equipment” below for more information. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

Gas Groups

The following paragraphs group flammable and explosive mixtures of specific gases and vapors in accordance with the NEC classifications. For a complete list of group classifications for Class I materials, see NFPA 497, "Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas" or IEC 60079-12, "Classification of Mixtures of Gases or Vapors with Air According to their Maximum Experimental Safe Gaps and Minimum Igniting Currents."

Equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations, as defined in Article 505 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of area classification, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group IIA — Atmospheres containing acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases of vapors of equivalent hazard.

Class I, Group IIB — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, ethyl nitrate, or gases or vapors of equivalent hazard.

Division 1 & 2

A (acetylene)
B (hydrogen)
C (ethylene)
D (propane)

Zone 0, 1 & 2

IIC (acetylene and hydrogen)
IIC (acetylene and hydrogen)
IIB (ethylene)
IIA (propane)

Temperature Considerations

For equipment evaluated for Class I, Zone 0, 1 and 2 hazardous locations the operating temperature is the maximum temperature of any external or internal surface to which the surrounding atmosphere has access, based on the protection method employed.

Equipment is required to be marked with the operating temperature or temperature class (T-code).

The marked temperature or temperature class shall not exceed the ignition temperature of the specific gas or vapor mixture to be encountered.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be evaluated for any or all of the Class I Zones and Groups as defined in the NEC. In an intrinsically safe circuit, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Articles 504 and 505 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and which are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous locations unless use in hazardous locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous Locations

Equipment relating to Class I, Zone 0, 1 and 2 hazardous locations includes electrical equipment not intended for installation in hazardous locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the Listings and Classifications.

Enclosure Considerations for All Equipment

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist inspection authorities, electrical equipment Listed or Classified for use in and relating to hazardous locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use
2	Indoor use, limited amounts of falling water
3R	Outdoor use, undamaged by the formation of ice on the enclosure**
3	Same as 3R plus windblown dust
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden

**Enclosure
Type Number**

4
4X
5
6
6P
12, 12K
13

**Provides a Degree of Protection Against the Following Environmental
Conditions***

Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure**
Same as 4 plus resists corrosion
Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids
Same as 3R plus entry of water during temporary submersion at a limited depth
Same as 3R plus entry of water during prolonged submersion at a limited depth
Indoor use, dust, dripping noncorrosive liquids
Indoor use, dust, spraying water, oil, and noncorrosive coolants

*All types of enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All types of enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

In some cases, individual appliances and equipment may be marked "Raintight" or "Rainproof" indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as "Raintight" such exposure will not result in entrance of water. For equipment designated as "Rainproof" such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, "Classification of Degrees of Protection Provided by Enclosures," provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure (or IP rating) as follows:

First Characteristics**Numerical**

IP0X
IP1X
IP2X
IP3X
IP4X
IP5X
IP6X

Protection Against Ingress of Solid Foreign Objects

Not evaluated
50 mm diameter or larger
12.5 mm diameter or larger
2.5 mm diameter or larger
1.0 mm diameter or larger
Dust protected
Dusttight

Second Characteristics**Numerical**

IPX0
IPX1
IPX2
IPX3
IPX4
IPX5
IPX6
IPX7
IPX8

Protection Against Ingress of Water with Harmful Effect

Not evaluated
Vertically dripping
Dripping (15 degree tilted)
Spraying
Splashing
Jetting
Powerful jetting
Temporary immersion
Continuous immersion

Fittings at Supply Entries

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

Wiring Considerations for All Equipment

Appliances and Utilization Equipment Terminations — Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

For Type of protection "e," increased safety, field wiring conductors shall be copper.

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A)

should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations — Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75C” or “60/75C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75°C or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75°C or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75°C or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper-clad Aluminum Conductors — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper, and copper-clad aluminum conductors.

Wire Connectors — Combinations of dissimilar conductors in terminals or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wiring Connectors and Soldering Lugs (ZMVV) in UL’s Electrical Construction Equipment Directory.

Terminals — Product terminals, including wire connectors and terminal screws are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

Seals in Conduit and Cable Systems — Equipment with a factory-installed conduit seal is marked “Leads factory sealed” or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 501.16 of the NEC should be determined.

Cautionary Statements and Instructions — It is expected that the user shall strictly adhere to cautionary statements and other instructions appearing on the product and in accompanying literature.

Standards and Protection Methods

The standards used to investigate products in this part of the directory address the risk of explosion associated with installation in a classified area, as well as the risk of fire and electric shock associated with any electrical equipment. The basic hazardous locations standards used to investigate products in this Part of the Directory with respect to risk of explosion are referenced below for the area classifications and protection methods shown. Note that for Zone 0 and Zone 1 equipment, UL 60079-0, “Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements,” is also applicable.

Area Classification	UL Standard	ProtectionMethodIdentification
Zone 0	UL 60079-11, Electrical Apparatus for Explosive Gas Atmospheres – Part 11: Intrinsic Safety “i”	ia
Zone 1	UL 60079-1, Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Flameproof Enclosures “d”	d
	UL 60079-5, Electrical Apparatus for Explosive Gas Atmospheres – Part 5: Powder Filling “q”	q
	UL 60079-6, Electrical Apparatus for Explosive Gas Atmospheres – Part 6: Oil Immersion “o”	o
	UL 60079-7, Electrical Apparatus for Explosive Gas Atmospheres – Part 7: Increased Safety “e”	e
	UL 60079-11, Electrical Apparatus for Explosive Gas Atmospheres – Part 11: Intrinsic Safety “i”	ib
	UL 60079-18, Electrical Apparatus for Explosive Gas Atmospheres – Part 18: Encapsulation “m”	m
	UL 60079-15, Electrical Apparatus with Type of Protection “n”	nA, nC or nR
Zone 2		

The basic unclassified (ordinary) locations standard used to investigate products in this part of the directory with respect to risk of fire and electric shock is UL 508, “Industrial Control Equipment” unless otherwise specified in the general Guide Information for each product category.

IV. MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been evaluated in accordance with the applicable requirements of UL, the United States Coast Guard, the American Boat and Yacht Council Inc. and the National Fire Protection Association. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

BOXES, JUNCTION AND PULL FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (BGYM)

This category covers sheet-metal boxes, cast-metal boxes, and nonmetallic boxes intended for making wiring connections only.

All boxes in this category are for use with threaded rigid conduit or steel intermediate metal conduit, or other approved wiring methods in accordance with Section 505-15 of the NEC, NFPA 70.

Boxes identified with an enclosure type designation are intended for use as indicated in the guide information at the front of this Directory (AANZ).

Cast-metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton.

Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton. Such boxes are protected with asphalt-base paint or the equivalent.

Where field installation of certain kinds of equipment is acceptable, which may include terminals, jumpers, busbars, conduit fittings, etc., the installation instructions provided with the product will specify the type, number and mounting arrangements for the equipment to be installed.

The basic ordinary location standard used to investigate products in this category is UL50, “Enclosures for Electrical Equipment”, in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number and one of the following product names: “Junction and Pull Box For Hazardous Locations”, “Junction Box For Hazardous Locations”, “Pull Box For Hazardous Locations”, or other appropriate product name.

CABLE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (CYMJ)

USE

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of cable to equipment in Class I, Zone 0, 1 and 2 hazardous (classified) locations as indicated in the individual Listings. The termination and sealing fittings are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of Listed cable of the type indicated in the individual Listings. No splices of conductors are intended to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer’s instructions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2225, “Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Type + Cable Sealing Fitting for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

+ Generic cable designation, such as MC-HL, ITC-HL, etc.

**CONDUIT FITTINGS FOR USE IN
CLASS I, ZONE 0, 1 AND 2
HAZARDOUS LOCATIONS (EBMB)**

See also Outlet Boxes for use in Class I, Zone 0, 1 and 2 Hazardous Locations.

The following types of fittings are included in this category:

Conduit fittings for draining or venting are for mounting in existing conduit openings of conduit boxes and electrical devices. Fittings for draining or venting which do not mount in existing conduit openings, such as those with threads smaller than 1/2 in. trade size, are covered under the Component Recognition Program of Underwriters Laboratories Inc.

Conduit unions are for use in threaded rigid conduit wire raceways.

Conduit unions, 90 degree box connector type are for use at threaded openings of devices in accordance with requirements of the National Electrical Code.

Conduit unions, universal type box connector are for use at threaded openings of devices in accordance with requirements of the National Electrical Code and may be assembled at angle greater than 90 degrees.

Flexible connection fittings are substantial fittings having insulated inner wall and flexible-metal outer wall encased in metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

Prospective users should first ascertain from authorities having jurisdiction under what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short radius capped elbows are intended for use where it is desirable to have a 90 degree bend and where wires may be guided when being pulled through the conduit line.

Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous location devices and extra hard service type flexible cord, having a grounding conductor, for portable equipment.

Fittings which are raintight or concretetight are so marked, or this information is provided with the fitting.

Cast-aluminum alloy conduit fittings covered by these listings are not considered acceptable for installation in concrete or cinder fill, unless protected with asphalt-base paint or the equivalent.

The basic ordinary location standard used to investigate products in this category is UL514B. Fittings for Conduit and Outlet Boxes in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Conduit Fitting For Hazardous Locations" or other appropriate product name as shown in the individual Listing.

**CORROSION MEASURING
EQUIPMENT FOR USE IN CLASS I,
ZONE 0, 1 AND 2 HAZARDOUS
LOCATIONS (ELHN)****USE AND INSTALLATION**

This category covers corrosion measuring equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of corrosion measuring systems

Certain products in this category are associated apparatus and are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

UNEVALUATED FACTORS

The accuracy of the equipment covered in this category has not been evaluated.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are identified in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Corrosion Measuring Equipment for Use in Hazardous Locations" or "Corrosion Measuring Equipment (Associated Apparatus)" or other appropriate product name as shown in the individual Listings.

**DRILLING EQUIPMENT FOR USE IN
CLASS I, ZONE 0, 1 AND 2
HAZARDOUS LOCATIONS (FDJJ)**

This category covers products specifically intended for installation on oil rigs and drilling platforms.

**MARINE SHIPBOARD CABLE FITTINGS
FOR USE IN CLASS I, ZONE 0, 1 AND 2
HAZARDOUS LOCATIONS (FDJR)****USE**

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of marine shipboard cable to equipment in hazardous (classified) locations. The termination and sealing fittings are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are intended to be made in the fitting. Restrictions on application, position and/or location of the fitting are indicated in the manufacturer's instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings include an evaluation for conformity to the installation and use provisions of Sub-part 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive) as applied by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2225, "Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations," in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable Fitting for Use in Hazardous Locations" or "Marine Shipboard Cable Sealing Fitting for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

**EMERGENCY LIGHTING EQUIPMENT
FOR USE IN CLASS I, ZONE 0, 1 AND
2 HAZARDOUS LOCATIONS (FTHR)**

This category covers automatic transfer switches designed for control of emergency lighting and power circuits in hazardous locations as required by Articles 500, 505 and 700 of the National Electrical Code. The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers Unit Equipment, but not separate lamp heads or lighting fixtures.

The basic ordinary location standard used to investigate products in this category is UL 924, "Emergency Lighting and Power Equipment", in conjunction with the Standards referenced in the Main Guide information (AANZ).

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: "Emergency Lighting Equipment for Use in Hazardous Locations", "Emergency Fluorescent Lighting Fixtures for use in Hazardous Locations", or other appropriate product name as shown in the individual Listing.

ENCLOSURES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FTQH)

These enclosures are for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with the National Electrical Code: Class I, Zone 0, 1, and 2. Classification covers the enclosure only.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

Classified by Underwriters Laboratories Inc.
as to explosion and fire hazard only.
Enclosures for use in Hazardous Locations.

LUMINAIRES AND FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHRV)

LUMINAIRE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHSN)

USE

This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

Also included are conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for support of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires," in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fixture Fitting for Hazardous Locations," "Luminaire Fitting for Hazardous Locations," "Electric Lighting Fixture for Hazardous Locations When Completely Assembled With UL Listed Fixture Fittings for Hazardous Locations" or "Luminaire for Hazardous Locations When Completely Assembled With UL Listed Luminaire Fittings for Hazardous Locations."

LUMINAIRES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHTF)

USE

This category covers incandescent lamp, fluorescent lamp, high intensity discharge lamp or surgical type luminaires for use in Class I, Zone 0, 1 and 2 hazardous locations.

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Luminaires without guards should be used only where not subject to breakage.

Luminaires suitable for wet locations are so marked.

Luminaires marked "Suitable for use in suspended ceilings," in combination with the Listing Mark, are intended to be mounted in openings of a suspended ceiling. They are marked with the minimum spacings between adjacent luminaires to side walls and to the structural ceiling above the luminaires. The space between the suspended ceiling and the structural ceiling must contain relatively unobstructed air space around the luminaires equal to the marked spacings. Fluorescent lamp type luminaires are suitable for end-to-end mounting. The test conditions do not anticipate external heat sources in the ceiling area such as steam pipes, heating ducts, and the like.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, "Luminaires," in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Lighting Fixture for Hazardous Locations" or "Luminaire for Hazardous Locations."

FLASHLIGHTS AND LANTERNS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IJRF)

Flashlights and lanterns Listed for any of the groups under Class I hazardous locations have been tested with respect to use in the presence of specific flammable gas or vapor-air atmospheres. The tests have been conducted using specific lamp and battery combinations. The lamp designation and the number, type, size and voltage of the batteries to be used are marked on the product.

Safety of operation in the presence of explosive mixtures may be endangered if replacement parts other than those specified on the product are used.

The basic standards used to investigate products in this category are referred in the main guide information, (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Flashlight for Use in Hazardous Locations" or "Lantern for Use in Hazardous Locations", or other appropriate product name as shown in the individual Listing.

GAS OR VAPOR DETECTION EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 OR 2 HAZARDOUS LOCATIONS (JLVG)

HEATERS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KHTG)

ELECTRICAL RESISTANCE HEAT TRACING CABLE SETS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KIHP)

USE

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This category covers heat tracing cables intended for pipe line or vessel heat tracing.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications," in conjunction with the Standards referenced in AANZ.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Tracing Cable Set for Use in Hazardous Locations" or "Heat Tracing Cable System for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listings.

HEATERS, INDUSTRIAL AND LABORATORY FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KIKU)

PRODUCT TYPES

This category covers paint heaters, ovens, hot plates, and other types of heaters as described in the individual Listings.

INSTALLATION INSTRUCTIONS

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary instructions are marked on the equipment.

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 499, "Electric Heating Appliances," together with the hazardous locations standards referenced in the main Guide Information (AANZ)

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "Listed," a control number, and one of the following product names: "Industrial and Laboratory Heater for Use in Hazardous Locations," "Industrial Heater for Use in Hazardous Locations," "Laboratory Heater for Use in Hazardous Locations" or other appropriate product name as shown in the individual Listing.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWEX)

The Listing covers the following products:

Control Panels and Assemblies
Motor Controllers
Programmable Controllers

Enclosed industrial control equipment is intended for use as indicated in the general guide information at the front of Part II of this directory.

Industrial Control Equipment is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Industrial Control Equipment, for which accessory kits are available for the field or distributor modification of the basic product or which may be assembled in many forms from separate components are marked to indicate the suitable accessories or separate components which may be used.

If the rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

Overload relays or industrial control equipment incorporating overload relays are identified as to their maximum tripping time at 600 per cent of the overload relay current element trip rating. The designations "Class 10, Class 20 and Class 30" are used to identify the maximum tripping times, with the Class number indicating the maximum tripping time in seconds. Overload relays with maximum tripping times of 10 or 30 seconds are marked Class 10 or Class 30 respectively. Overload relays with a maximum tripping time of 20 seconds may be marked Class 20. Overload relays with tripping times in excess of 30 seconds are marked with their maximum tripping times. All unmarked overload relays have a maximum tripping time of 20 seconds.

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CONTROL PANELS AND ASSEMBLIES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWFA)

USE AND INSTALLATION

This category covers control panels and assemblies consisting of enclosures and electrical components such as push button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.

The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product. Modular assemblies must be installed in accordance with the installation instructions provided with each part.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

It is intended that wiring between the electrical components of modular assemblies be field installed.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for AC horsepower ratings and at 10 times motor full load running current for DC horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Receptacles with plugs included on Listed assemblies have been subjected to endurance and overload operation tests in the presence of the specific flammable atmospheres for Class I locations.

The plugs of the receptacle-plug combinations are for use with extra hard usage flexible cord with grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which those assemblies having receptacles with plugs will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Control Panel for Use in Hazardous Locations," "Control Assembly Cover for Use in Hazardous Locations" or "Control Assembly Body for Use in Hazardous Locations."

MOTOR CONTROLLERS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWFE)

Motor controllers are Listed under the following categories:

Auxiliary Devices
Combination Motor Controllers
Float-and Pressure-Operated Motor Controllers
Magnetic Motor Controllers
Manual Motor Controllers
Miscellaneous Motor Controllers

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by

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fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings and at ten times motor full load running current for d-c horsepower ratings.

Auxiliary Devices for Use in Class I, Zone 0, 1 & 2 Hazardous Locations (NWFN)

The auxiliary devices covered in this category are intended for use in control circuits of magnetic motor controllers (and the like) and consist of the following devices:

- Machine Operated Switches
- Push Button Stations (including parts such as pilot lights, meters, terminal blocks, and selector switches.)
- Miscellaneous Manually Operated Switches.
- Magnetically Operated Switches.

Auxiliary devices provided with a factory seal of conductors entering the pilot light or switch enclosure are so identified by a marking on the product.

Pilot lights without guards should be used only where not subject to breakage.

Enclosures furnished without mechanisms are marked to identify the mechanisms that are to be used.

The Listing also includes auxiliary devices which have been reconditioned. Reconditioned auxiliary devices may also be referred to as rebuilt. Reconditioned auxiliary devices are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned auxiliary devices are subject to the same requirements as new auxiliary devices.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations", or "Industrial Control Equipment Enclosure (or Ind. Cont. Eq.) For Use In Hazardous Locations or other appropriate product name as indicated in the individual Listing." For rebuilt products, the product name is preceded by either "Reconditioned" or "Rebuilt".

Combination Motor Controllers for Use in Class I, Zone 0, 1 & 2 Hazardous Locations (NWFP)

This category covers combination motor controllers.

Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

Combination motor controllers are marked "Combination Motor Controller" to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) for use in Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations".

Magnetic Motor Controllers for Use in Class I, Zone 0, 1, & 2 Haz. Loc. (NWFR)

Magnetic Across-The-Line Starters are listed under this category.

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Safety of operation of oil immersed type starters will be endangered should the oil level be below the minimum shown by indicator. These devices should be installed with a Listed sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Magnetic switches for controlling other than motor loads are Listed under Auxiliary Devices.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names:

"Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations", or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosures For Use In Hazardous Locations".

Manual for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFU)

Manual Across-the-Line Starters are covered in this category.

Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations" or other appropriate product name as shown in the individual Listing.

INTRINSICALLY SAFE EQUIPMENT AND SYSTEMS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (OEVS)

This category covers products and systems which have been investigated as to intrinsic safety only, as it pertains to use in hazardous locations. Included are intrinsically safe products, intrinsically safe systems, associated apparatus with intrinsically safe circuit extensions, and other arrangements involving intrinsic safety as identified in the individual descriptions.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

(Product Name)
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
ONLY AS TO INTRINSIC SAFETY
FOR USE IN HAZARDOUS LOCATIONS
(Control Number)

MOTORS AND GENERATORS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (PRSN)

MOTORS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (PRZA)

USE

This category covers motors intended for use in Class I, Zone 0 1 and 2 hazardous (classified) locations.

The Listing Mark on a motor applies to the motor, but not to any equipment driving or driven by the motor. In the case of a motor generator set provided with a common base, the motor and generator each will bear its respective Listing Mark.

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ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The hazardous (classified) locations standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1004, "Electric Motors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Use in Class I, Zone 0, 1 and 2 Hazardous Locations."

MOTORS, SPECIALTY FOR USE IN CLASS I, ZONE 0, 1, AND 2 HAZARDOUS LOCATIONS (PRZM)

USE AND INSTALLATION

This category covers specialty motors for use in Class I, Zone 0, 1, and 2 hazardous (classified) locations.

These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -20°C (-4°F) to +40°C (+104°F).

The Listing Mark on a specialty motor applies to the motor, but not any equipment driving or driven by the motor.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1004, "Electric Motors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Specialty Motor for Use in Hazardous Locations."

OUTLET BOXES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QBBC)

See also Conduit and Cable Fittings.

Conduit Boxes are for use in threaded rigid conduit or steel intermediate metal conduit wire raceways, or other approved wiring methods in accordance with Section 505-15 of the NEC, NFPA 70 (1996). They provide for splicing of conductors but conductors should not be sealed in conduit boxes. The boxes are marked to indicate when accessories such as unions and sealing fittings are furnished with the box.

Boxes marked "rain tight" have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in entrance of water.

Cast-aluminum alloy outlet boxes are not considered acceptable for installation in concrete or cinder fill unless protected with asphalt base paint or the equivalent.

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: "Outlet Box for Hazardous Locations".

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PANELBOARDS, LIGHT AND POWER FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QFKR)

Enclosed panelboards listed under Class I, Zones 0, 1 and 2 are of the manually operable, air break type and employ circuit breakers having automatic overload protection.

The enclosed panelboards included in the following individual listings are for lighting and low capacity power distribution.

These panelboards are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Each marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Panelboard For Hazardous Locations" or other appropriate product name as shown in the individual Listing.

PROCESS CONTROL EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QVAJ)

USE AND INSTALLATION

This category includes process control equipment consisting of instruments for measurement, recording and/or control of process variables, and auxiliary devices used therewith such as sensors, transducers and valve operators.

Equipment intended to be installed only in process control panels is so identified in the Listing. Such equipment is not intended for field installation.

Intrinsically safe systems covered by these Listings have been investigated on the basis that all equipment connected to the system is Listed as part of the system unless otherwise indicated and is used as intended.

INSTALLATION INSTRUCTIONS

Safety may be affected if the manufacturer's installation instructions are not followed.

Barriers and Barrier Units
Converters
Power Supplies
Recorders
Valve Positioner
Transmitters and Receivers

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in the main Guide information (AANZ).

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Process Control Equipment for Hazardous Locations," "Process Control System for Hazardous Locations," "Process Control Unit for Hazardous Locations," "Process Control Equipment (Associated Apparatus)," "Process Control Unit (Associated Apparatus)" or other appropriate product name as shown in the individual Listing.

RECEPTACLE-PLUG COMBINATIONS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (RSUN)

RECEPTACLES WITH PLUGS INTERLOCKED WITH SWITCHES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (RSZD)

Receptacles covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using compo-

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nents specified in the individual Listings. Final assembly of receptacles in the field is to be done in accordance with instructions provided with the product by the manufacturer. Care should be taken to ensure that minimum IP ratings are maintained for field assembled increased safety enclosures.

Receptacles with plugs interlocked with switches are constructed with interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit or other suitable wiring method to the switch compartments. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic hazardous locations standards used to investigate products in this category are specified in the main guide information (AANZ).

The basic ordinary location standard used is UL 1682, "Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Receptacle Interlocked with Switch for Hazardous Locations", "Plug for Hazardous Locations", "Receptacle Cover Assembly Interlocked with Switch for Hazardous Locations", or "Body Assembly for Hazardous Locations" or other appropriate product name as indicated in the individual Listing.

SIGNAL APPLIANCES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (UXUQ)

AUDIBLE-SIGNAL FOR USE IN CLASS I, ZONE 0, 1 & 2 HAZARDOUS LOCATIONS (UXVF)

This category includes audible-signal devices, such as Bells, Sirens, and Horns.

Audible-signal devices Listed for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Audible Signal Appliance for Use in Hazardous Locations" or other appropriate product name.

VISUAL-SIGNAL FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (UXVU)

This category includes visual-signal devices, such as Rotating Beacons and Strobe Lights.

Visual-signal devices Listed for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

The basic standards used to investigate products in this category are referenced in the main guide information under (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word

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"LISTED", a control number, and the following product name: "Visual Signal Appliance for Use in Hazardous Locations" or other appropriate product name.

SOLENOIDS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (VAMH)

This category includes solenoids for installation on valves. The solenoids are incomplete devices inasmuch as the plungers or pistons are intended to actuate an external valve or other equipment. These Listing cover the solenoid only and not the valve or other equipment to which the solenoids are mounted.

The basic standard used to investigate products in this category is UL429, "Electrically Operated Valves" in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Solenoid for Use in Hazardous Locations" or other product name as indicated in the individual Listing.

SWITCHES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (WTSN)

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

ENCLOSED SWITCHES FOR USE IN CLASS I, ZONE 0, 1, AND 2 HAZARDOUS LOCATIONS (WUGF)

This category covers enclosed switches either with or without fuse holders for plug or cartridge fuses.

Ratings of Listed enclosed switches for hazardous locations are limited to 3600 amp, 500 hp, 600 v.

Enclosed switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with ampere rating are intended for general use.

Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less, and the use of 75 C wire for higher ampere rated circuits.

Enclosed motor-circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating-current ratings and at four times motor full load running current for direct-current ratings.

The basic standards used to investigate products in this category are indicated in the main Guide Information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED", a control number, and the following product name: "Enclosed Switch For Hazardous Locations".

TELEMETERING EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1, AND 2 HAZARDOUS LOCATIONS (WYMG)

This category includes telemetering transmitter coil assemblies, small generators, pulse generators, fluid flow indicators and meters, transmitter and receiver units employing selsyn motors and similar equipment.

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Investigation of telemetering equipment marked "Raintight" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Telemetering equipment provided with a factory seal of conductors entering the device enclosure is so identified on the product.

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

The basic ordinary location standard used to investigate products in this category is UL 508, "Industrial Control Equipment" in conjunction with the standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Telemetering Equipment for Use in Hazardous Locations", "Section of Telemetering Equipment for Use in Hazardous Locations", "Telemetering Equipment Relating to Hazardous Locations" or "Section of Telemetering Equipment Relating to Hazardous Locations", an appropriate abbreviation, or other appropriate product name as shown in the individual Listing.

TEMPERATURE-INDICATING AND REGULATING EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (XBAI)

INSTALLATION AND USE

This category covers electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. These devices respond directly or indirectly to changes in temperature, humidity, or pressure to affect temperature control, or equipment or appliance operation, etc.

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Temperature-indicating and regulating equipment is Listed with a maximum rating of 600 V.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in "pilot duty" is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75-80 percent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

The Listings of motor operators do not include valves or other connected mechanical loads.

The Thermostats in the following Listings can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 873, "Temperature-Indicating and Regulating Equipment" together with the standards referenced in the main Guide Information (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Thermostat for Use in Hazardous Locations," "Temperature-Indicating Equipment for Use in Hazardous Locations," "Temperature-Indicating Equipment (Associated Apparatus)" or other appropriate product name as shown in the individual Listing.

2003 General Information for Selected Categories from the Electrical Appliance and Utilization Equipment Directory

PART IV

Electrical Equipment for Use in Ordinary Locations (AALZ)

I. GENERAL

This directory includes electrical equipment intended for use in ordinary locations as defined in NFPA 70, “National Electrical Code” (NEC). Electrical equipment for installation in hazardous (classified) locations, as defined in the NEC, is covered in UL’s Hazardous Locations Equipment Directory. Electrical equipment for use in hazardous locations may also be used in ordinary locations.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL’s Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL’s Products Certified in Accordance with International and Regional Standards Directory.

Equipment intended for fire protection purposes, including fire suppression equipment, fire alarm equipment, and fire services equipment is covered in UL’s Fire Protection Equipment Directory.

Some ordinary location electrical equipment is provided with special features concerning its use in fire resistive assemblies. Such equipment (e.g., recessed fixtures or outlet boxes) is also Classified for fire resistance as noted in the general Guide Information for the individual product category and is covered in UL’s Fire Resistance Directory.

Equipment used for the storing, containing, conveying, dispensing, regulating or use of flammable and combustible liquids and gases, and controls and detectors for the equipment in this directory are covered in UL’s Flammable and Combustible Liquids and Gases Equipment Directory.

Equipment used in heating, cooling, refrigerating, ventilating and cooking applications, as well as accessories associated with such equipment are covered in UL’s Heating, Cooling, Ventilating and Cooking Equipment Directory.

Equipment for use aboard marine vessels or in a marine environment is covered in UL’s Marine Products Directory.

Plumbing system appliances, fixtures, fittings and piping are covered in UL’s Plumbing and Associated Products Directory.

III. EVALUATION REQUIREMENTS AND STANDARDS

Electrical equipment for use in ordinary locations has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC.

Some products are certified for uses not within the scope of the NEC. Such products are evaluated for the specifications or the use conditions indicated in the general Guide Information for each product category.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

The general Guide Information for each product category describes the limitations relative to the products covered, such as current, voltage and horsepower limits, markings, special descriptions and installation provisions.

IV. INSTALLATION REQUIREMENTS

Ordinary locations as defined in the NEC include:

Damp Location — Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, barns, and cold-storage warehouses.

Dry Location — A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Wet Location — Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, and locations exposed to weather and unprotected.

Outdoor Use — In general, individual appliances and equipment have been investigated only for use indoors, in dry locations. An exception is where outdoor use is specifically permitted by the Article of the NEC concerned with the product installation. See also the general Guide Information for the product category or included in the individual Listing. In some cases the title (e.g., Snow Movers, Swimming Pool Fixtures) indicates the conditions for which the product has been investigated.

Cord and plug-connected appliances obviously intended for outdoor use, such as gardening appliances, are not intended for use in the rain, and should be stored indoors when not in use.

Enclosure Types

Section 110.11 of the NEC specifies that equipment shall be identified for use in certain operating environments. Section 300.6 provides guidance regarding protection against corrosion and Table 430.91 provides the basis for selecting motor controller enclosure types for use in specific locations. To assist inspection authorities, UL requires type designations on power distribution and control equipment enclosures such as cabinets and cutout boxes, enclosed panelboards or switchboards, meter sockets, enclosed circuit breakers or switches, industrial control and other equipment. The following table summarizes the intended uses of the various type enclosures for other than hazardous locations:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use
2	Indoor use, limited amounts of falling water
3R	Outdoor use, undamaged by the formation of ice on the enclosure**
3	Same as 3R plus windblown dust
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden
4	Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure**
4X	Same as 4 plus resists corrosion
5	Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids
6	Same as 3R plus entry of water during temporary submersion at a limited depth
6P	Same as 3R plus entry of water during prolonged submersion at a limited depth
12, 12K	Indoor use, dust, dripping noncorrosive liquids
13	Indoor use, dust, spraying water, oil and noncorrosive coolants

*All type enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All type enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

An enclosure that complies with the requirements for more than one type of enclosure may be marked with multiple designations.

Enclosures marked with a type may also be marked as follows:

- A Type 1 enclosure may be marked "Indoor Use Only"
- A Type 3, 3S, 4, 4X, 6 or 6P enclosure may be marked "Raintight"
- A Type 3R enclosure may be marked "Rainproof"
- A Type 4, 4X, 6 or 6P enclosure may be marked "Watertight"
- A Type 4X or 6P enclosure may be marked "Corrosion Resistant"
- A Type 2, 5, 12, 12K or 13 enclosure may be marked "Driptight"
- A Type 3, 3S, 5, 12K, or 13 enclosure may be marked "Dusttight"

For equipment designated "Raintight," testing designed to simulate exposure to a beating rain will not result in entrance of water. For equipment designated "Rainproof," testing designed to simulate exposure to a beating rain will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure. "Watertight" equipment is so constructed that water does not enter the enclosure when subjected to a stream of water. "Corrosion resistant" equipment is so constructed that it provides degree of protection against exposure to corrosive agents such as salt spray.

"Driptight" equipment is so constructed that falling moisture or dirt does not enter the enclosure. "Dusttight" equipment is so constructed that circulating or airborne dust does not enter the enclosure.

Sizes and Ratings

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

Marked ratings of utilization equipment include ampere, wattage or volt-ampere ratings. Motor-operated utilization equipment may also be marked with a horsepower rating. The actual marked ratings (other than the horsepower rating) and other markings or instructions, if any, are to be used to select branch circuit conductors, branch circuit overcurrent protection, control devices and disconnecting means.

The ampere or wattage marking on power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an

increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Appliance and Utilization Equipment Terminations

Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations

Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked "75C" or "60/75C," it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75°C or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75°C or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75°C or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper-clad Aluminum Conductors — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded, unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Wire Connectors — Combinations of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wire Connectors and Soldering Lugs (ZMVV).

Terminals — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment and appliances, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

V. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VI. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VII. MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been evaluated in accordance with the applicable requirements of UL, the United States Coast Guard, the American Boat and Yacht Council Inc. and the National Fire Protection Association. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL's Marine Mark is suitable for use only with stranded copper wire.

AIR CONDITIONING EQUIPMENT (AAYZ)

The physiological effects which may be produced by use of the equipment listed herein have not been investigated.

ABSORPTION AIR CONDITIONING EQUIPMENT (ABCT)

Equipment covered in this section is of the unitary type employing an absorption type refrigeration system, and intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is rated 600 v or less and is intended primarily, but not exclusively, for air conditioning application, to be installed in accordance with the requirements of the National Electrical Code NFPA No. 70. The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat; and/or gas-, oil-, or gas-oil-fired burners.

Equipment to be connected to an air duct system is intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilation Systems, No. 90A, or for Warm Air Heating and Air Conditioning Systems, No. 90B. Equipment with a gas-, oil-, or gas-oil-fired burner(s) is intended to be installed in accordance with appropriate Standards of the National Fire Protection Association which includes the Standards for Oil Burning Equipment, NFPA No. 31; National Fuel Gas Code, NFPA No. 54; Liquefied Petroleum, NFPA No. 58.

Unitary absorption air conditioning equipment consists of one or more factory-built sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the absorption air conditioning assembly. Equipment provided in two or more sections is marked to identify the appropriate sections for proper installation.

For Listings of absorption air conditioning equipment which are provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating, see Absorption Air Conditioning Equipment (KTSY) in The Gas and Oil Equipment Directory.

In units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor components and wiring are investigated on the basis of compliance with the motor branch circuit, short-circuit and ground fault protection requirements of Sec. 430-53(c) of the 1984 edition of the National Electrical Code, NFPA No. 70. Such multimotor and combination

load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is to be protected only by the type of protective devices specified.

Units which are suitable for outdoor installation are so marked. Sections not marked as suitable for outdoor installation are for indoor use only.

The basic standard used to investigate products in this category is UL 465, "Central Cooling Air Conditioners".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Absorption Air Conditioning Equipment".

ACCESSORIES, AIR CONDITIONING EQUIPMENT (ABFY)

The accessories covered in this section are Listed for installation only on Listed equipment as designated in the individual Listings of the equipment and accessory. The accessories are intended primarily for field installation, but may be factory installed.

The equipment on which an accessory covered in this section may be field installed is marked to indicate that it is Listed for use with the specific accessory as designated by model, catalog number, part number, etc. in this section. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed.

Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

The basic standards used to investigate products in this category are the standards applicable to the equipment on which the accessories are intended to be installed.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Air Conditioning Equipment Accessory."

ACCESSORIES, AIR DUCT MOUNTED (ABQK) USE

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SELECTED CATEGORIES FROM THE
ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT
DIRECTORY**

This category covers products consisting of parts and/or subassemblies employing ultraviolet lamps for the purpose of treating air by the effects of ultraviolet radiation and having provisions for connection to heating and ventilation ducts used for air distribution.

INSTALLATION

Equipment to be connected to an air duct system is intended for installation in accordance with NFPA 90A, "National Fire Protection Association Standard for Installation of Air Conditioning and Ventilating Systems" or NFPA 90B, "National Fire Protection Association Standard for Warm Air Heating and Air Conditioning Systems."

PRODUCT MARKINGS

Information concerning field wiring connections, mounting location, installation clearances, etc., are either marked on the accessory and/or in detailed installation instructions accompanying each accessory.

Products intended for use with germicidal lamps are marked "This product (fixture) is designed for use with germicidal lamps and must be installed in compliance with competent technical directions so that the user's eye and bare skin will not be subjected to ultraviolet rays."

UNEVALUATED FACTORS

The health aspects associated with the use of these products and their ability to aid in disinfection of environmental air have not been investigated by UL. This limitation is specified in the instruction manual and on the product for all products covered under this category.

ADDITIONAL INFORMATION

For additional information, see Air Conditioning Equipment (AAYZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 153, "Portable Electric Lamps," UL 1598, "Luminaires" and UL 1995, "Heating and Cooling Equipment."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Air Duct Mounted Accessory," "WITH RESPECT TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY," and a control number.

AIR CONDITIONERS, CENTRAL COOLING (ACAV)

Equipment covered in this category is of the unitary type, rated 135,000 Btu per hour or less, for commercial or domestic central cooling applications, to be installed in accordance with the requirements of the National Electrical Code. This equipment is rated 600 v or less.

For listings of central air conditioning equipment rated more than 135,000 Btu per hour, see Air Conditioning Systems Equipment (ADPZ).

Equipment to be connected to an air duct system is intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilation Systems, 90A, or for Warm Air Heating and Air Conditioning Systems, 90B. When installed in mobile homes, reference should be made to The Code of Federal Regulations, Chapter XX, Part 3280.

Unitary air conditioners consist of one or more factory made sections, as described below. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the air conditioner assembly. Unless so indicated in the individual Listings, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section. The listing of the air conditioner shows the distinctive designation of each section comprising the assembly; where so designated a separately Listed Electric Central Heating Furnace, Guide KOVX, Fan-Coil Unit, Guide LZQV, or Fan Unit, Guide LZSY, may serve as a section of the assembly.

Self-contained. Refrigeration system in one section, factory assembled, with refrigerant charge and tested for leaks.

Compressor evaporator/ condenser. Refrigeration system in two sections, one including the compressor and the evaporator and the other, the condenser. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the compressor evaporator unit name plate. Each section is tested for leaks.

Condensing unit/evaporator. Refrigeration system in two sections, the condensing unit section including the compressor and condenser and the other section the evaporator. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the condensing unit name plate. Each section is tested for leaks.

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The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the air conditioner.

In air conditioners employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground fault protection requirements of Sec. 430-53(c) of National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

The sections which are suitable for outdoor installation are so marked. Sections not marked as suitable for outdoor installation are for indoor use only.

For separate listing of condensers, condensing units, unit coolers, and evaporators see "Refrigeration Equipment" in this Directory.

Units that have been investigated and found suitable for use with field installed steam or hot water coils are specifically indicated in the individual listings.

Air conditioners for duct connection incorporating factory-installed electric resistance heaters are identified in the individual listings.

Except as indicated in the following paragraphs the effect of heating appliances with which equipment covered by these listings may be integrated has not been investigated.

Where Listed duct heaters (see Heaters, Duct in this List) are used in conjunction with air conditioners designated in these listings by + or by reference to Note 1 in this guide information in horizontal or up-flow operation, and the duct heater is installed downstream from the air conditioner so as to provide at least 4 ft spacing between the nearest air conditioner and duct heater surfaces, and the air conditioner is not provided with factory- or other field-installed heaters, tests have indicated that no adverse thermal effects are produced.

The suitability of the electrical interconnection of the air conditioner and duct heaters is subject to the jurisdiction of the local inspection authority.

Air conditioners, which have been found suitable for use with duct heaters for mounting arrangements, other than indicated above, are designated in these listings as described in the following paragraph.

Units that have been investigated and found suitable for use with Listed field installed accessories such as electric resistance heaters (including duct heaters) are specifically indicated in the individual Listings.

Where a clearance is required to be maintained to combustible construction, the clearance is designated in the individual listings and is also marked on the air conditioner. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

Unless otherwise specified in the listing and marking, the unit may be installed on combustible flooring.

Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided with the unit.

In air conditioners employing electric resistance heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the air conditioner or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the air conditioner is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically recognized for use with electric space heaters provided as part of this equipment, see "Control Panels, Remote, for Electric Space Heating Equipment," in this Directory. Other Listed separated assemblies, as referenced on the air conditioner marking, may also be used.

The basic standard used to investigate products in this category is UL465, "Central Cooling Air Conditioners".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Central Cooling Air Conditioner", "Section of Central Cooling Air Conditioner" or "Accessory for Central Cooling Air Conditioner".

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AIR CONDITIONERS, PACKAGED TERMINAL (ACKZ)

USE AND INSTALLATION

This category covers packaged terminal air conditioners rated 600 V or less, intended to be installed in accordance with the requirements of NFPA 70, "National Electrical Code." They consist of a wall sleeve and a combination of assemblies designed as a unit and intended as the prime source of refrigeration and dehumidification. They may also have provision for heating by hot water, reverse cycle refrigeration, steam, electricity or gas-fired burner(s). They are intended for installation through walls and are basically intended to serve a single room, zone or space although some units may have provision to additionally serve an adjacent room. These units employ alternating current, hermetic refrigerant motor compressors with factory charged refrigeration systems and include a means for ventilation and circulating air.

This category does not cover equipment intended for connection to duct systems for the purpose of providing central cooling and/or heating.

Permanently-connected units are intended to be connected to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time delay fuses are required for restarting, the unit is marked to this effect.

If the marking specifies an "HACR Type" circuit breaker, the unit can be protected by either fuses or an "HACR Type" circuit breaker. If the marking specifies a circuit breaker or overcurrent protective device, the unit can be protected by fuses, an "HACR Type" circuit breaker or any properly sized circuit breaker.

Cord-connected units which require a circuit breaker or time delay fuses to permit restarting are marked to this effect.

Units employing gas heat are intended to be installed in accordance with the installation instructions and markings on the appliance, and are intended to be connected to a gas supply of the type specified on the appliance. Equipment is intended to be installed in accordance with the current edition of ANSI Z223.1/NFPA 54, "National Fuel Gas Code."

UNEVALUATED FACTORS

The effect of these units on the fire resistance rating of the wall has not been investigated.

RELATED PRODUCTS

For related products; see Air Conditioners, Room (ACOT) and Gas-fired Room Heaters, Vented (LPNH).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the refrigeration portion of the products in this category is UL 484, "Room Air Conditioners." The basic standard used to investigate the gas heating portion of the products in this category, if provided, is the current edition and effective addenda thereto of ANSI Z21.86/CSA 2.32, "Vented Gas-Fired Space Heating Appliances."

UL MARK

The Listing Mark and Gas-Fired Listing Mark, if gas heat is provided, of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Packaged Terminal Air Conditioner," "Section of Packaged Terminal Air Conditioner" or "Cooling Portion of Packaged Terminal Air Conditioner."

The Gas-Fired Listing Mark for the gas heating portion of these products, if provided, includes the UL symbol with the words "GAS-FIRED" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product name "Gas Heating Portion of Packaged Terminal Air Conditioner," and the standard designation "ANS Z21.86(+) CSA-2.32(+)(++) Fan-Type Direct Vent Wall Furnace."

(+) - Suffix letter of latest addendum if applicable

(++) - Issue year of latest addendum or standard

AIR CONDITIONERS, ROOM (ACOT)

These Listings include room air conditioners and recreational vehicle (RV) air conditioners rated up to 600 v ac. They are encased assemblies designed as a unit and intended as the prime source of refrigeration and dehumidification, basically intended to serve a single room, zone, or space.

The room air conditioners are intended for installation in windows, through walls, or as consoles located in or adjacent to the room, zone, or space to be conditioned.

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The RV air conditioners are intended for roof top or underfloor mounting as indicated in the installation instructions.

These units employ alternating current, hermetic refrigerant motor compressors with factory charged refrigeration systems and include a means for circulating air. They may also have provision for heating and ventilation. The room air conditioners are not intended for connection to duct systems for the purpose of providing central cooling and/or heating. The RV air conditioners may be ducted to remote areas of the vehicle as specified in installation instructions which include the minimum duct size, maximum length, and minimum register size. The effect of in wall units on the fire resistance rating of the wall has not been investigated.

A console or in wall type room air conditioner may have provision to additionally serve a single adjacent room.

Some room air conditioners are designed for field interconnection with a matching section. Such units and sections are marked to relate the two for proper installation.

Units with water cooled condensers investigated for connection to ground water sources are so marked.

The RV air conditioners are intended only for permanent connection to the source of electrical supply.

Permanently-connected units are to be connected to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time delay fuses are required for restarting, the unit is marked to this effect.

If the marking specifies "HACR Type" circuit breakers, the unit can be protected by either fuses or "HACR Type" circuit breakers. If the marking specifies circuit breakers or overcurrent protective devices, the unit can be protected by fuses, "HACR Type" circuit breakers or any properly sized circuit breakers.

Cord-connected units which require circuit breakers or time delay fuses to permit restarting are marked to this effect.

These units may be provided with electric heaters.

For Listings of packaged terminal air conditioners, see "Air Conditioners, Packaged Terminal" (ACKZ).

The basic standard used to investigate products in this category is UL484, "Room Air Conditioners."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Room Air Conditioner" or "Section of Room Air Conditioner."

AIR CONDITIONERS, SPECIAL PURPOSE (ACVS)

Equipment covered in this section is designed for special purposes, such as environmental control of computer rooms. It is intended for installation in accordance with the requirements of the National Electrical Code. Presently Listed equipment is rated 600 v or less.

This equipment consists of one or more factory made sections, as described below. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the air conditioner assembly. Unless so indicated in the individual Listings, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section. The listings of the air conditioner shows the distinctive designation of each section comprising the assembly; where so designated a separately Listed Fan-Coil Unit, Guide LZQV, or Fan Unit, Guide LZSY, may serve as a section of the assembly.

Self-contained. Refrigeration system in one section, factory assembled, with refrigerant charge and tested for leaks.

Compressor evaporator. Unit, includes one or more compressors and evaporators with interconnecting refrigerant tubing and with associated controls and wiring. Unit is factory assembled and tested for leaks, and the operating refrigerant charge may or may not be provided as indicated on the unit nameplate.

These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate.

Compressor evaporator/ condenser. Refrigeration system in two sections, one including the compressor and the evaporator and the other, the condenser. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the compressor- evaporator unit name plate. Each section is tested for leaks.

Condensing unit/evaporator. Refrigeration system in two sections, the condensing unit section including the compressor and condenser and the

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other section the evaporator. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the condensing unit name plate. Each section is tested for leaks.

For separate listing of condensers, see "Condensers, Refrigerant" (SLSV) in this Directory.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the unit.

In units employing two or more motors or a motor(s) and other loads, operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Units which are suitable for outdoor installation are so marked. Units not marked as suitable for outdoor installation are for indoor use only.

Units that have been investigated and found suitable for use with Listed field installed accessories such as electric resistance heaters are specifically indicated in the Individual Listings.

Where a clearance is required to be maintained to combustible construction, the minimum clearance is designated in the individual listings and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts, and plenum.

Unless otherwise specified in the Listing and Marking, the unit may be installed on combustible flooring.

Computer room air conditioners are intended for installation in accordance with the Standard of the National Fire Protection Association for Protection of Electronic Computer/Data Processing Equipment, No. 75. These air conditioners are generally installed on the raised floors of computer rooms and have not been investigated for connection to ducts unless so specified in the individual listing. Factory-installed electric heaters and humidifiers have been investigated for the application.

In units employing electric resistance heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps.

The overcurrent protective devices are either included as an integral part of the unit or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with electric space heaters provided as part of this equipment, see "Control Panels, Remote for Electric Space Heating Equipment", in this Directory. Other Listed separate assemblies as referenced on the equipment marking, may also be used.

The basic standards used to investigate products in this category are UL465, "Central Cooling Air Conditioners" or UL484, "Room Air Conditioners".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Special Purpose Air Conditioner", "Section of Special Purpose Air Conditioner", or "Accessory for Special Purpose Air Conditioner".

PACKAGED TERMINAL, REPLACEMENT AIR CONDITIONERS (ADAU)

The products covered in this category are replacement packaged terminal air conditioner chassis investigated for field installation with existing wall sleeves, louvers, and panels as marked on the unit. They are rated 600 V or less and are intended to be installed in accordance with the requirements of the National Electrical Code, NFPA 70. They are intended as the prime source of air conditioning and dehumidification.

They may also have provision for heating by hot water, reverse cycle refrigeration, steam or electric resistance elements. They are intended for installation through walls and are basically intended to serve a single room, zone or space although some units may have provision to additionally serve an adjacent room. These units employ alternating current, her-

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metic refrigerant motor compressors with factory charged refrigeration systems and include a means for ventilation and circulating air. These Listings do not cover equipment which is intended for connection to duct systems for the purpose of providing central cooling and/or heating. The effect of these units on the fire resistance rating of the wall has not been investigated.

Permanently-connected units are to be connected to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time delay fuses are required for restarting, the unit is marked to this effect.

If the marking specifies an "HACR Type" circuit breaker, the unit can be protected by either fuses or an "HACR Type" circuit breaker. If the marking specifies a circuit breaker or overcurrent protective device, the unit can be protected by fuses, an "HACR Type" circuit breaker or any properly sized circuit breaker.

Cord-connected units which require a circuit breaker or time delay fuses to permit restarting are marked to this effect.

The basic Standard used to investigate products in this category is UL 484, "Room Air Conditioners".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) and a control number on the product is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

**"Replacement Packaged Terminal Air Conditioner
CLASSIFIED BY**

**UNDERWRITERS LABORATORIES INC.
AS TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY.
FOR FIELD INSTALLATION WITH EXISTING WALL SLEEVES,
OUTDOOR LOUVERS,
AND INDOOR PANELS AS SPECIFIED ON THE PRODUCT".
(Control Number)**

AIR CONDITIONING AND REFRIGERATION SYSTEMS EQUIPMENT (ADBT)

This category covers products with refrigerating systems classified in accordance with Section 9 of ANSI/ASHRAE 15, Safety Code for Mechanical Refrigeration.

Equipment covered in this category has a rated cooling capacity exceeding 135,000 Btu per hour and is intended for commercial or industrial air conditioning and refrigeration applications, to be installed in accordance with the requirements of the National Electrical Code.

Self-contained units include a complete refrigeration system, factory tested and sealed, with associated controls and wiring.

Compressor-condenser units include one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring.

These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit.

Compressor-evaporator units include one or more compressors and evaporators with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the Compressor-evaporator unit data plate.

Compressor units include one or more compressors, and may include oil separators and oil coolers with associated controls, wiring and interconnecting refrigerant tubing. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit, and to a remote condenser.

For listings of equipment rated 135,000 Btu per hour or less see "Air Conditioners, Central Cooling," or "Condensing Units" in this directory. For listings of self-contained units with a rated cooling capacity of 135,000 Btu per hour or less and which incorporate gas, oil or gas-oil fired burners, see Heating and Cooling Units (LYRR) in the Heating, Cooling, Ventilating and Cooking Equipment Directory. For separate listings of condensers, evaporators, and unit coolers see Refrigeration Equipment in this directory.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

REFRIGERATING SYSTEM OF

**(product name shown in individual classifications)
CLASSIFIED BY**

**UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH SECTION 9 OF ANSI/ASHRAE 15-1994
(Control Number)**

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The symbol UL in a circle is not used on or in connection with these products.

AIR CONDITIONING LIQUID CHILLERS (ADCR)

Equipment covered in this Section is intended for cooling of liquid, such as water or water-antifreeze solutions. The equipment is intended primarily, but not exclusively, for air conditioning application, to be installed in accordance with the requirements of the National Electrical Code. Presently listed equipment is rated 600 v or less, except that centrifugal type units (identified in the individual Listings) are rated 5,000 v or less.

For drinking water coolers, commercial processing water coolers, and other liquid chillers which have been investigated only for commercial refrigeration applications other than air conditioning. See "Refrigeration Equipment" in this Directory.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the unit.

For Listings of absorption air conditioning equipment which utilizes hot fluid (such as gas, liquid or steam) as the direct energy source for cooling and heating, see Absorption Air Conditioning Equipment (ABCT) in the Electrical Appliances and Utilization Equipment Directory.

For Listings of absorption air conditioning equipment which are provided with a gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating, see Absorption Air Conditioning Equipment (KTSY) in the Gas and Oil Directory.

In liquid chillers employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Units which are suitable for outdoor installation are so marked. Units not marked as suitable for outdoor installation are for indoor use only.

Liquid chillers with a rated cooling capacity exceeding 135,000 Btu per hr are not identified by model number in the individual Listings, and may be either self-contained units or compressor cooler units.

Self-contained units include a complete refrigeration system, factory tested, with associated controls and wiring.

Compressor-cooler units include one or more compressors and coolers (evaporators) with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate.

Self contained units or compressor cooler units may be shipped in more than one section. Individual sections are identified for field installation according to the manufacturer's specifications.

For Listings of condensers see "Refrigeration Equipment (SCER)".

Air conditioning liquid chillers rated 135,000 Btu per hr or less are identified by model numbers in the individual Listings and are of the unitary type, consisting of one or more sections. If the equipment is provided in two or more sections, each section is designed for field interconnection with a matched section(s) to comprise the assembly. The Listing shows the distinctive designation for each section of the assembly.

The basic standard used to investigate products in this category is UL465, "Central Cooling Air Conditioners".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Liquid Chiller, Self-Contained Unit", "Liquid Chiller, Compressor-Cooler Unit", "Air-Conditioning Liquid Chiller", and "Section of Air-Conditioning Liquid Chiller".

AIR CONDITIONING SYSTEMS EQUIPMENT (ADPZ)

Equipment covered in this section has a rated cooling capacity exceeding 135,000 Btu per hour and is intended for commercial or industrial central cooling application, to be installed in accordance with the requirements of the National Electrical Code. Presently listed equipment is rated 600 v or less.

Equipment to be connected to an air duct system should be installed in accordance with the Standard of the National Fire Protection Association

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for Installation of Air Conditioning and Ventilating Systems, No. 90A. Equipment with gas, oil or gas-oil fired heating means is intended to be installed in accordance with the appropriate Standards of The National Fire Protection Association, which include The Standards for Oil Burning Equipment, No. 31; National Fuel Gas Code, No. 54; Liquefied Petroleum Gas, No. 58.

Self-contained units include a complete refrigeration system, factory tested and sealed, with associated controls and wiring.

Compressor-condenser units include one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit.

Compressor-evaporator units include one or more compressors and evaporators with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate.

Compressor units include one or more compressors with associated controls and wiring. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit; and to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate.

Self-contained units and compressor evaporator units may include heating means, including: electric resistance heaters; gas, oil or gas-oil fired burners; or hot water or steam coils.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the unit.

In units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Units which are suitable for outdoor installation are so marked. Units not marked as suitable for outdoor installation are for indoor use only.

For listings of equipment rated 135,000 Btu per hour or less see "Air Conditioners, Central Cooling," or "Condensing Units" in this List.

For listings of self-contained units with a rated cooling capacity of 135,000 Btu per hour or less and which incorporate gas, oil or gas-oil fired burners, see "Heating and Cooling Units" in The Gas and Oil Equipment List.

For separate listings of condensers, evaporators, and unit coolers see "Refrigeration Equipment" in this List.

Units which have been found suitable for use with listed air conditioning equipment accessories, are so marked. See "Air-Conditioning Equipment Accessories" in this List for conditions of use.

Self-contained units and compressor evaporator units that have been investigated and found suitable for use with field installed steam or hot water coils or with electric resistance heaters are marked to so indicate.

Except as indicated in the following paragraphs the effect of heating appliances with which equipment covered by these listings may be integrated has not been investigated. For air conditioning units and air conditioners recognized for use with heating appliances, see "Air Conditioning Units" and "Furnaces, Electric Central Heating" in this List.

Where Listed electric duct heaters (see Heaters, Duct, in this List) are used in conjunction with self-contained units or compressor evaporator units which are marked for connection of duct heaters and the heaters are installed in horizontal or up-flow operation to provide at least 4 ft spacing between the nearest unit and duct heater surfaces, and the unit is not provided with factory- or other field-installed heaters, tests have indicated that no adverse thermal effects are produced.

The suitability of the electrical interconnection of the unit and duct heater is subject to the jurisdiction of the local inspection authority.

Units which have been found suitable for use with duct heaters for mounting arrangements other than indicated above are marked with the type or model designation of the duct heater and with the mounting arrangement investigated and found suitable.

Where a clearance should be maintained to combustible construction, the clearance is marked on the unit. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, duct, and plenum.

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Where a clearance is not marked on the unit, the unit may be installed with zero clearance to combustible construction. Unless otherwise specified in the marking, the unit may be installed on combustible flooring.

In units employing electric resistance heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the unit or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically recognized for use with electric space heaters provided as part of this equipment, see "Control Panels, Remote, for Electric Space Heating Equipment", in this List. Other Listed separate assemblies, as referenced on the equipment marking, may also be used.

The basic standards used to investigate the refrigeration portion of the products in this category are UL303, "Refrigeration and Air Conditioning Condensing and Compressor Units" and UL465, "Central Cooling Air Conditioners". The standard used to investigate the gas heating portion of the products is UL795, "Commercial-Industrial Gas Heating Equipment", or other standards as identified on the Classification Mark appearing on the product.

The Listing Mark and/or Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and/or Classification and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Air Conditioning Systems Equipment, Self-Contained Unit", "Air Conditioning Systems Equipment, Cooling Portion of Self-Contained Unit", "Air-Conditioning Systems Equipment, Compressor-Evaporator Unit", "Air-Conditioning Systems Equipment, Compressor-Condenser Unit", "Air-Conditioning Systems Equipment, Compressor Unit". The Classification Marking (shown below) is optional on a Listed Self-Contained Unit and may be included on units identified as "Listed Cooling Portion of Self-Contained Unit."

**GAS HEATING PORTION
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH
ANSI-Z21. _____ + _____ STANDARD
++
+47 or 64 as appropriate
++Issue date of Standard or latest addendum**

A gas-fired duct furnace included in this product category is for use only in specified air conditioning systems equipment as marked on the furnace and as indicated in the individual Classification.

The Classification Mark (shown below) is applicable to a gas fired duct furnace contained as part of air conditioning systems equipment for which the refrigeration portion has not been investigated.

**CLASSIFIED BY
UNDERWRITERS LABORATORIES INC. AS A
GAS FIRED DUCT FURNACE ONLY**

AIR FILTERING APPLIANCES (AEDX)

This category covers portable or stationary air filtering appliances intended for window, floor, table and similar mounting. This category also covers fixed air filtering appliances intended for permanent mounting to walls, ceilings, and similar applications. The appliances consist primarily of air-circulating fans and mechanical filters.

Appliances not provided with filters intended for circulating air in a room are listed under Fans, Ceiling Suspended or Fans, Electric. Appliances consisting of air circulating fans, filters, and radiators that are intended to be connected to existing steam or water lines are listed as Heating, Cooling, and Ventilating Equipment.

The physiological effects of the operation of these appliances beneficial or otherwise, have not been investigated by Underwriters Laboratories Inc.

The basic standard used to investigate products in this category is UL507, "Electric Fans".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Air Filtering Appliance", "Air Filter", or other appropriate product name.

DEHUMIDIFIERS (AERV)

The appliances covered in this section are self-contained appliances for removing moisture from the air.

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DEHUMIDIFIERS, REFRIGERATION TYPE (AFFT)

This category covers portable self-contained household, commercial and industrial dehumidifiers for removing moisture from the air. These appliances are designed for cord connection to a single phase, alternating current source of supply rated at not more than 250 volts. These units employ hermetic refrigerant motor compressors and may also incorporate electric air heaters.

The basic standard used to investigate products in this category is UL474, "Dehumidifiers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Dehumidifier" for a household unit or "Special Purpose Dehumidifier" for a commercial or industrial unit.

ELECTROSTATIC AIR CLEANERS (AGGZ)

This listing covers electrostatic air cleaners of the following types which are intended to remove airborne dust particles and the like:

Duct Type: Room Type-Fixed, Stationary, or Portable.

Electrostatic air cleaners of the Duct Type are for installation in and adjoining heating air conditioning and ventilating ducts in accordance with the Standard for Installation of Air-Conditioning and Ventilating Systems, NFPA 90A and the Standard for Installation of Residence Type Warm-Air Heating and Air-Conditioning Systems, NFPA 90B.

Electrostatic air cleaners of the Duct Type may be for installation in an exhaust system of restaurant type cooking equipment. They are intended for installation in accordance with the Standard of the National Fire Protection Association for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment, NFPA 96, and are so marked. When installed in accordance with NFPA 96, a Listed grease filter or extractor must be installed ahead of the air cleaner.

Electrostatic air cleaners of the Room Type are self-contained units. The fixed types are for permanent installation. The portable or stationary types are cord connected.

Electrostatic air cleaners are intended for use where removal of dust and dirt from the equipment is frequent enough to prevent excessive accumulation, which may result in flash over and fire damage. The instructions and warnings supplied with and on each piece of equipment should be carefully observed.

Electrostatic Air Cleaners have either Class 1 or Class 2 filters or adhesive coated ionizer collector cells as follows:

Class 1 filters or adhesive coated ionizer collector cells are those which, when clean, do not contribute fuel when attacked by flame and which emit only negligible amounts of smoke.

Class 2 filters or adhesive coated ionizer collector cells are those which, when clean, burn moderately when attacked by flame or emit moderate amounts of smoke or both.

Electrostatic Air Cleaners designed to be assembled together in the field from component parts are Listed by Report. Under this form of Listing, a Report is prepared which provides information sufficient to effect assembly and installation in the field. Copies of the report are available from the Listee.

The basic standard used to investigate products in this category is UL867, "Electrostatic Air Cleaners".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrostatic Air Cleaner".

EVAPORATIVE COOLERS (AGNY)

USE AND INSTALLATION

This category covers evaporative coolers of portable, window and stationary types for residential, commercial and industrial applications. Stationary types may have provision for connection to a duct system for air distribution. Models evaluated for outdoor installation are marked "Outdoor Use."

Motors used in stationary equipment intended for duct system connection are prevented from hazardous overheating by inherent overheating devices, by overcurrent protective devices, or by impedance of the motor windings.

Units permanently connected to the source of supply are intended to be installed in accordance with the requirements of NFPA 70, "National Electrical Code."

Evaporative media provided on stationary units that are intended for connection to a duct system in accordance with the International Mechanical

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cal Code, NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems" or NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems" are investigated in accordance with UL 900, "Air Filter Units." These products are also suitable for installation in accordance with the Uniform Mechanical Code.

RELATED PRODUCTS

Some stationary, duct-connected evaporative coolers are covered under Evaporative Coolers Evaluated in Accordance with the Uniform Mechanical Code (AGOS). Air coolers that include a motor compressor and refrigeration system are covered under Room Air Conditioners (ACOT). Products intended primarily for circulating moistened air are covered under Humidifiers (AHIV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 507, "Electric Fans."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Evaporative Cooler" or "Evaporative Air Cooler."

HEAT PUMPS (AGUX)

Equipment covered in this category are reverse cycle unitary air conditioning systems for comfort heating or heating and cooling, intended for installation in accordance with the National Electrical Code. This equipment is rated 600 v or less. The equipment is for both heating and cooling unless otherwise indicated in the individual Listing.

Equipment to be connected to an air duct system is intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilating Systems, 90A, or for Warm Air Heating and Air Conditioning Systems, 90B. When installed in mobile homes, reference should be made to the Code of Federal Regulations, Chapter XX, Part 3280.

Unitary heat pumps consist of one or more factory made sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the heat pump assembly. The listing of the heat pump shows the distinctive designation of each section comprising the assembly; where so designated, separately Listed Electric Central Heating Furnace, Guide KOVX, Fan-Coil Unit, Guide LZQV, or Fan Unit, Guide LZSY, may serve as an indoor section.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the heat pumps.

In heat pumps employing two or more motors or a motor and supplementary electric heater operating from a single supply circuit the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is to be protected only by the type of protective device specified.

Heat pumps which include factory-installed supplementary electric heaters are identified in the individual listings.

Where Listed duct heaters (see Heaters, Duct, in this Directory) are used in conjunction with heat pumps designated in these listings by "D" or by reference to Note 1 in this guide information in horizontal or up-flow operation, and the duct heater is installed downstream from the heat pump so as to provide at least 4 ft spacing between the nearest heat pump and duct heater surfaces, and the heat pump is not provided with factory- or other field-installed supplementary heaters, tests have indicated that no adverse thermal effects are produced.

The suitability of the electrical interconnection of the heat pump and duct heater is subject to the jurisdiction of the local inspection authority.

Heat pumps which have been found suitable for use with specific duct heaters for mounting arrangements, other than indicated above, are designated in these listings as described in the following paragraph.

Units that have been investigated and found suitable for use with Listed field installed accessories such as electric resistance heaters (including duct heaters) are specifically indicated in the individual Listings.

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Where a clearance is required to be maintained to combustible constructions, the clearance is designated in the individual listings and is also marked on the heat pump. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperature below established criteria have been measured on a wooden test enclosure, representing combustible construction spaced at the specified clearance (air) from the unit, ducts, and plenum.

Unless otherwise specified in the listing and marking, the unit may be installed on combustible flooring.

Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided with the unit.

The sections which are suitable for outdoor installation are so marked and are identified in the individual Listings either by the term "outdoor section" or by an appropriate footnote. Sections not marked as suitable for outdoor installation are for indoor use only.

For separate listing of Refrigeration Accessories and Refrigerant-Containing Components see "Refrigeration Equipment" (SCER) in this Directory.

Heat pumps which have been found suitable for use with Listed air conditioning equipment accessories are identified in the individual listings. See "Air-Conditioning Equipment Accessories" (ABFY) in this Directory.

In heat pumps employing electric resistance heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the heat pump or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the heat pump is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically recognized for use with electric space heaters provided as part of this equipment, see "Control Panels, Remote, for Electric Space Heating Equipment," (KMLW) in this Directory. Other Listed separate assemblies, as referenced on the heat pump marking, may also be used.

The basic standard used to investigate products in this category is UL559, "Heat Pumps".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Heat Pump", "Section of Heat Pump" or "Accessory for Heat Pump".

HUMIDIFIERS (AHIV)

This category covers humidifiers for residential and commercial applications that are intended to circulate moistened air and generally incorporate an air circulating fan with or without filters. Stationary types may have provision for connection to heating and ventilating ducts for air distribution.

Motors used in stationary equipment intended for duct connection are prevented from hazardous overheating by inherent overheating devices, overcurrent protective devices, or inherent impedance. Air filters provided on stationary types are investigated in accordance with Standard UL900 Test Performance of Air Filter Units.

The basic standard used to investigate humidifiers is UL998, "Humidifiers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Humidifier".

HUMIDORS (AHNW)

This category covers humidors for residential and commercial applications that are intended to maintain a specific humidity within the cabinet. These products generally incorporate a humidification system with or without a fan.

Motors are prevented from hazardous overheating by inherent overheating devices, overcurrent protective devices, or inherent impedance.

These cabinets generally incorporate luminaires.

The basic standards used to investigate humidors are UL65, "Electric Wired Cabinets" and UL998, "Humidifiers". The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name: "Humidor".

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ANTENNA DISCHARGE UNITS (ASWA)

USE

This category covers antenna discharge units intended to minimize the effects of voltage surges on antenna transmission lines.

These products have not been investigated to determine their suitability as lightning protective devices.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 452, "Antenna Discharge Units."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Antenna Discharge Unit" or other appropriate product name as shown in the individual Listings.

BOILERS, ELECTRIC (BDJS)

This category covers electrically heated steam and hot water boilers that are within the scope of ASME Boiler and Pressure Vessel Codes, Volume I (Power Boilers) and Volume IV (Heating Boilers). This category may also include water heaters if, based on water temperature, input rating, or water tank capacity, they fall under the scope of the above ASME codes.

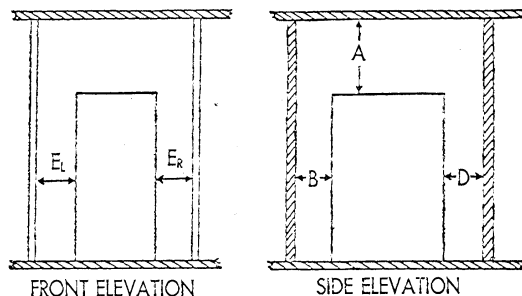
The pressure vessels of these appliances are constructed and stamped in accordance with the applicable section of the ASME Boiler and Pressure Vessel Code. The boilers are equipped with necessary temperature or pressure regulating and limit controls and with the appropriate ASME rated pressure relief devices and they are marked with the appropriate ASME symbol.

Water heaters for potable water limited to a maximum water temperature of 99C (210F) are covered under the various subcategories of the category Water Heaters (KSAV). Other hot water and steam generating equipment employing construction outside the scope of the ASME Boiler and Pressure Vessel Code are covered under the Heaters and Heating Equipment (KKBV) subcategories of Industrial and Laboratory (KQLR); Cooking Appliances, Commercial (KNGT) and Household (KNUR); and Heaters, Miscellaneous (KSOT).

Each boiler is provided with marking which indicates the floor material (combustible or noncombustible) on which the boiler may be mounted and the necessary clearances from all other surfaces of the boiler to combustible materials.

The minimum acceptable clearances in inches between the boiler surfaces and adjacent combustible surfaces, the type of flooring required for mounting the boiler and the proper installation in an alcove or closet are indicated on the published printed cards by appropriate symbols and dimensions. The clearances so designated are the minimum required to avoid overheating; additional clearances may be required for accessibility. Each clearance requirement is indicated on the published printed cards by appropriate symbols and dimensions.

A boiler installation is indicated as follows:



Description of dimension, symbols and abbreviations.

A-Clearance above top of boiler.

B-From front of boiler. Prefix "C" to numeral indicates suitability for closet or alcove installations; prefix "A", suitability for alcove installation but not for closet.

D-From back of boiler.

EL-From left side of boiler.

ER-From right side of boiler.

F-Indicates type of flooring; "NC" for noncombustible; "C" for combustible.

Numerical indicates minimum clearance below suspended units to combustible floor.

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G-Total minimum free area in square inches of closet ventilating openings.

The basic standard used to investigate products in this category is UL834, "Heating, Water Supply, and Power Boilers-Electric".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Boiler" or other appropriate wording.

CHRISTMAS TREE AND DECORATIVE OUTFITS (DGVT)

This category covers temporary-use, seasonal decorative lighting products and accessories with a maximum input rating of 120 volts a.c. Temporary use is considered to be a period of installation and use not to exceed 90 days per year. A seasonal product is a product painted in colors to suggest a holiday theme or a snow covering, a figure in a holiday costume, or any decoration associated with a holiday or a particular season of the year.

The products contained within this category are factory-assembled, portable and intended for connection to a receptacle.

This category does not contain non-seasonal lighting, non-seasonal products, permanently connected products, non-decorative lighting intended for general illumination only, cord sets (extension cords) or relocatable power taps.

In listing Christmas tree and Decorative outfits, it is assumed that any medium base, intermediate base, candelabra base, miniature base or midget-base lamps to be used in these products are made in accordance with American National Standards Institute specifications as well as applicable UL 588 requirements. The use of lamps which are not in conformance with such standards may present shock hazards or high temperature conditions which are in excess of safe limits of operation.

CHRISTMAS TREE AND DECORATIVE OUTFIT ACCESSORIES (DGWU)

This category covers accessories which are intended for use with decorative lighting strings and decorative outfits. This includes such items as flasher controllers with or without sound, and other miscellaneous devices that provide a decorative effect for use with decorative lighting strings and decorative outfits. The accessories may be in the form of a direct plug in type.

This category does not cover decorative lamps, decorative lighting strings, decorative outfits, electric ornaments, cord sets (extension cords), temporary power taps, decorative lighting harnesses, or any other non-decorative lighting products.

The basic Standard used to investigate products in this category is the Standard for Christmas-Tree and Decorative-Lighting Outfits, UL588.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Decorative Outfit Accessory".

ELECTRIC ORNAMENTS (DGXC)

This category covers electric ornaments. An electric ornament is a unit provided with input leads and an adapter intended to take the place of a push-in lamp in a series-connected decorative lighting string or decorative outfit. An ornament may be electronically or non-electronically-operated.

An electronically-operated ornament employs at least one of the following, a motor, a printed wiring assembly, electronic components, or the like. This type of ornament may produce sound, be illuminated, animated, or the like, or any combination of the above.

A non-electronically-operated ornament is provided with a wiring assembly consisting of only a lamp and lampholder on one end and an adapter on the other end. This type of ornament is illuminated only.

The basic standard used to investigate products in this category is the Standard for Christmas-Tree and Decorative-Lighting Outfits, UL 588.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Electric Ornament".

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LAMPS, DECORATIVE (DGXO)

This category covers intermediate-, and candelabra-base lamps classified for use in Listed Decorative Lighting Strings and Outfits.

The decorative lamps have been evaluated in accordance with the requirements specified in Supplement SA of UL 588, Standard for Christmas Tree and Decorative Outfits. These lamps have been evaluated with respect to lamp base gauging, exposure of live parts, envelope-to-base securement, center and side filament protrusion, and lamp-envelope temperature.

The basic standard used to investigate products in this category is UL 588, "Christmas Tree and Decorative Lighting Outfits".

In addition to the Classification Marking, the lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer's identification and model or catalog number. Each lamp is marked with the manufacturer's identification, rated voltage and wattage.

LOOK FOR CLASSIFICATION MARKING ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking for these products includes the name of Underwriters Laboratories Inc. together with the word "CLASSIFIED", a control number, and the product name, as illustrated below.

**DECORATIVE LAMP
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE IN LISTED DECORATIVE
LIGHTING STRINGS AND OUTFITS
(Control Number)**

OUTFITS, DECORATIVE (DGXW)

Decorative outfits are intended for seasonal, temporary use, not to exceed 90 days per year and include factory assembled decoration units, providing a seasonal theme, such as wreaths, stars, tree-top units, sprays, light sculptures, molded figures, such as a pumpkin or a snowman, candles or candle sets without lamp shades, tree stands, and motorized decorative displays having illumination or other decorative effects. Decorative outfits are intended for connection to a receptacle by means of an attachment plug and are portable. Decorative outfits do not cover decorative lighting strings or electric ornaments which are covered under their respective categories, (DGZZ) and (DGXC).

Decorative outfits are marked with the maximum number of strings, of the same type, to be connected together for series-connected outfits or the maximum number of lampholders for outfits that are parallel connected. Parallel type products should not be intermixed with series type products.

Decorative outfits are not intended to be permanently connected, and are not intended to be used as toys.

The basic Standard used to investigate products in this category is UL588, "Christmas Tree and Decorative Lighting Outfits".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Decorative Outfit".

STRINGS, DECORATIVE LIGHTING (DGZZ)

Decorative-lighting strings are intended for seasonal, temporary use, not to exceed 90 days per year, and consist of a string of lights which may be draped over or around trees or other objects for decorative effect. Decorative lighting strings are factory assembled with replaceable lamps, and are connected by means of an attachment plug or the like. Decorative lighting strings may be provided with individual lamp shades or diffusers over each individual lamp. Decoration units other than strings are covered in Decorative Outfits (DGXW), Decorative Outfit Accessories (DGWU) or Electric Ornaments (DGXC).

Strings are not intended for installation on artificial trees employing metal or metalized plastic needles, leaves or branch coverings. They also should not be installed in a manner which can cut or damage wire insulation.

Decorative-lighting strings for indoor use only, include, as part of the attached Listing Mark, the statement "For Indoor Use Only". In addition, the UL Mark and the word "LISTED" are printed in green ink.

Decorative-lighting strings for indoor use and outdoor use include, as part of the attached Listing Mark, the statement "For Indoor Use and Outdoor Use". In addition, the UL Mark and the word "LISTED" are printed in red ink.

Decorative-lighting strings are marked with the maximum number of strings, of the same type, to be connected together for series-connected lighting strings or the maximum number of lampholders for lighting strings that are parallel connected. Parallel type strings should not be intermixed with series type strings. Each string is marked with its type.

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Decorative lighting strings are not intended to be permanently connected or to provide general illumination. Decorative lighting strings do not employ lampholders larger than intermediate base and do not cover temporary lighting strings. Construction of strings which employ larger than intermediate base lampholders are covered under Temporary Lighting Strings (XBRT).

The basic standard used to investigate products in this category is UL 588, "Christmas-Tree and Decorative-Lighting Outfits".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Decorative-Lighting String For Indoor Use Only", "Decorative-Lighting String For Indoor Use and Outdoor Use".

CLEANING MACHINES (DMDT)

This listing covers:

Dishwashers, Commercial.

Dishwashers, Household.

High pressure cleaning machines, electrically operated.

Miscellaneous cleaning machines.

Vacuum cleaning machines and blower cleaners.

Appliances such as wet-pick-up vacuum cleaners intended to employ water or other solutions with similar characteristics are provided with means for grounding or are double insulated.

Appliances specified as double insulated are constructed with a special insulating system in lieu of grounding to comply with the provisions of Section 250-45(c) of the National Electrical Code. Such appliances are distinctively marked "Double-Insulated or Double Insulation."

In cases where the nature or construction of the equipment is such that precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warnings are marked on the equipment.

Those cleaning machines which have been found suitable for installation outdoors, or with sections exposed outdoors, are so indicated on the equipment.

The burglary and theft protection features of the coin operated machines have not been investigated.

VACUUM CLEANING MACHINES AND BLOWER CLEANERS (DMLW)

GENERAL

This category covers coin-operated vacuum cleaners and motor-operated vacuum cleaners and blower cleaners intended for household and commercial (industrial) use. Products intended for household use only are so marked. Attachments packaged with the products or indicated in the instruction manual packaged with the product are also covered under this category.

Central vacuum cleaners are intended for installation as part of a permanent central suction system in a building and investigated for remote operation.

This category also covers electrified wall inlet valve assemblies for use in central vacuum cleaning systems. These valve assemblies are intended for installation in accordance with Section 422.15 of NFPA 70, "National Electrical Code." The assemblies are shipped as a kit comprised of the mounting plate/rough-in box and cover plate. The cover plate identifies the appropriate hoses and nozzles Listed for use with the valve. The assembly bears the Listing Mark.

REBUILT PRODUCTS

This category also covers vacuum cleaners that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt vacuum cleaners are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt vacuum cleaners are subject to the same requirements as new vacuum cleaners.

UNEVALUATED FACTORS

Any health hazards that may be associated with the use of vacuum cleaners or combination blower and vacuum cleaners, such as dispersion of pathological, chemical, physical, radioactive, or other contaminating agents have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Cleaning Machines (DMDT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1017, "Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines."

UL MARK

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

CUSTOM-BUILT KIOSKS (EMHH)

General — This category covers kiosks, rated 240 V or less, normally found in offices and business establishments, educational facilities and other similar environments classified as ordinary locations.

These kiosks are intended but are not limited for business applications products, electronic point-of-sale, information or ticket machines

The product is typically an interactive kiosk. The unit is intended to be installed in an indoor environment unless specified otherwise. It consists of a wooden/metal cabinet that contains relocatable power tap(s), power supply adapter(s), monitor(s), computer(s), printer(s), fan(s) and speaker(s). This unit is considered movable, stationary or floor standing and uses a nondetachable power supply cord.

Kiosks are provided with assemblies or subassemblies, consisting of components such as amplifiers, cabling, CD-ROM drive and a floppy drive clock keyboard, CPU/Monitor, DVD player or from a database on network-server computer, ethernet card (dial-up connection or network link), input devices: trackball, number pad, light-pen/stylus, (magnetic strip) card reader, barcode reader, character keyboard (physical or virtual), Internet connectivity, light sensor enables automatic adjustment of the monitor intensity, modems, monitor (touch screen capacity), movement detector used to call attention of the passers-by, multimedia machine with ample RAM and fast hard drive access, power supply, printer: laser, dot matrix, and thermal, serial ports (touch screen), serial and printer ports for any peripheral device like modems or ISDN boards for communications and digital or analog I/O board used to control different kinds of processes, stereo speakers, telecommunications, telephone accessories, "Watched" timer that can ensure that the system resets in unlikely case of hang-ups, UPS or video graphics card.

Equipment Type — Assemblies and subassemblies may include but are not limited to central processing units (CPUs), disk drives, fiber optic transceivers, monitors, personal computers, plotters, printers, point of sale kiosk, scanners, including portable barcode scanners, tape drives, workstations, multi-media equipment/accessories: digital cameras, microphones, speakers, video conferencing systems, network connection equipment. Assemblies and subassemblies may include telecommunication equipment: telephone sets, facsimile machines, ISDN systems and telephones, modems, key telephone systems. Assemblies and subassemblies may include reproduction equipment: copiers or duplicating machines.

Interconnecting cable assemblies: cable assemblies intended for use within the kiosk.

Special Considerations — Card readers, badge readers and similar identification equipment used in the kiosk have not been investigated with respect to security. Equipment investigated with respect to security or burglary resistance is Listed or Classified in the Security Equipment Directory.

Related Equipment - General — Automated teller machines (ATMs) which have been investigated for security and burglary resistance are Listed under Automated Teller Systems (TPEU). ATMs which have not been investigated for security and burglary protection are Classified under Bank Equipment (BALT).

Installation — Kiosks have been determined to be suitable for use in ambient temperatures not exceeding the manufacturer's recommended ambient temperature as specified in the equipment's installation instructions.

Physiological Effects — The physiological effects of chemical substances used in or with this equipment have not been evaluated. The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been evaluated.

Requirements — The basic standard used to investigate individual assembly and subassembly components is UL 1950, "Information Technology Equipment, Including Electrical Business Equipment." Subject 2361, "Outline of Investigation for Custom-Built Kiosks" is used to investigate the overall product consisting of various assemblies and subassemblies contained in a cabinet.

Listing Mark — The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and category identifier: "Custom-Built Kiosks", or another appropriate product name as shown in the individual Listing

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DOOR, DRAPERY, GATE, LOUVER, AND WINDOW OPERATORS AND SYSTEMS (FDDR)

This category covers electrical and pneumatic door and gate systems, and door, drapery, gate, louver, and window operators together with controls and accessories for use with such operators, and similar devices.

This category covers door operators that have been investigated from an electrical and casualty viewpoint only. For door operators that have been additionally investigated for use on fire doors, see Fire Doors (GSNV) in Volume 3 of the Fire Resistance Directory.

Door and gate systems include doors or gates, operators, and controls, tested as complete units. Components of a system are specifically designated in the installation instructions provided with the system.

Residential door operators are intended for intermittent use on counter-balanced doors, usually of the overhead type, in residential buildings of one to four single-family occupancies. When provided, external entrapment protection devices such as photoelectric sensors or door edge sensors must be installed in accordance with installation instructions provided. In addition all installation instructions, including the installation of warning labels adjacent to the wall mounted actuating switch, should be followed.

This category also covers residential garage door operators that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt residential garage door operators are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt residential garage door operators are subjected to the same requirements as new residential garage door operators.

Accessories for residential garage door operators, such as external entrapment protection devices, should be installed and used only on door operators for which they are intended as marked on installation instructions and/or packaging.

Commercial and industrial door operators should not be installed in applications where the load exceeds the maximum power in foot-pounds per second or the maximum pull in lbs marked on the appliance. Light-duty, commercial vehicular door or door operators should not be installed in locations where the number of operations per hour exceed that marked on the appliance.

Operators intended for use with other than counter-balanced types of doors, gates or windows are tested in conjunction with the doors, gates or windows for which they are designed.

Residential drapery operators are intended for intermittent use controlling a maximum drapery weight of one lb per foot, unless otherwise marked.

Commercial drapery operators are intended for intermittent use controlling drapery of the maximum weight marked on the assembly.

It has been determined that the casualty hazards inherent in the products covered by this category have been reduced to an acceptable degree. However, the ultimate safety is dependent upon proper installation, and the Authorities Having Jurisdiction should be consulted. Installation should be performed by a qualified installer using manufacturer's instructions. Special care should be exercised during installation of all Operators to insure that recommended safety devices such as photoelectric sensors or reversing edge switches are properly installed. When so marked, industrial door operators shall be mounted a minimum of 8 ft (2.44 m) above the floor.

This category does not cover door operators incorporated as integral parts of walk-in panel units for use with refrigerator cooler installations; see Door Panel Assemblies (FDIT).

This category does not cover door or gate systems or other assemblies including break out or hinged sections intended to facilitate safe egress of persons in case of emergency. For such Listings see Controlled Exit Panic Devices (FUKD), Exit Doors (FUXV) and Panic Hardware (FVSR) in the Automotive, Burglary Protection and Mechanical Equipment Directory, and Door Closers, Holders and Operators (GTBT) and Fire Door Operators with Automatic Closers (GUJY) in the Building Materials Directory.

This category does not cover the burglary and theft protection features of vault doors or burglary-resistant electrically operated door mechanisms intended to control opening and closing of cell doors in a prison or institution. For such Listings see Burglary-resistant Electrically Operated Door Locking Mechanisms (CVXJ) and Vault Doors, Burglary-resistant (YUSR) in the Automotive, Burglary Protection and Mechanical Equipment Directory.

This category does not include the glass portions of the partitions, panels, or sections, associated with the operators and/or controls.

RELATED PRODUCTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 325, "Door, Drapery, Gate, Louver, and Window Operators and Systems."

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Door Operator," "Gate Operator," "Drapery Operator," "Window Operator," "Louver Operator" or other appropriate product name.

The Listing Mark for rebuilt residential garage door operators additionally includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the product name.

DOOR PANEL ASSEMBLIES (FDIT)

GENERAL

This category covers "walk-in" and "reach-in" door panel assemblies and related auxiliary devices intended for use with environmental, freezer or cooler rooms and cabinets.

The equipment is intended for permanent connection to alternating current circuits rated at not more than 600 V.

Panel assemblies and auxiliary devices are provided with an electrical system which serves to provide one or more of the following functions: illumination, prevention of ice formation, prevention of condensation, motor drives for opening and closing doors, etc.

Door panel assemblies consist of the door and/or the door frame.

Auxiliary devices consist of equipment other than door panel assemblies associated with the foregoing apparatus or functions, including insulated panels with electrical components.

Door panel assemblies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

RELATED PRODUCTS

Refrigerated cabinets and cases are covered under Commercial Refrigerators and Freezers (SGKW). Nonelectrical insulated wall panels are covered under Building Units (BLBT). Refrigeration units are covered under Units, Refrigerating (SPY2).

Factory assembled walk-in refrigerators and freezers are covered under Walk-in Units, Commercial (SQTV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 471, "Commercial Refrigerators and Freezers."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Door Panel Assembly" or "Auxiliary Insulated Panel."

FANS, CEILING-SUSPENDED (GPRT)

This category covers ceiling-suspended fans intended to be mounted to a ceiling outlet box or ceiling building structure, and whose blades rotate below the ceiling to move air for the purpose of air circulation.

This category does not cover ceiling-suspended fans intended to be used in hazardous locations as defined by the National Electrical Code, NFPA 70, or intended to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment.

Ceiling-suspended fans intended for mounting beneath a ceiling structure such as provided on porches or patios have been subjected to a water spray test and are marked as being acceptable for such use.

Ceiling-suspended fans and accessories intended for permanent installation are provided with means for connection to permanent wiring systems.

Light kits intended for use with ceiling-suspended fans are listed as Fan Accessories under this product category. They are provided with marking on the light kit, on the packaging carton and in the instructions to indicate the fan models with which they are suitable.

RELATED PRODUCTS

Fan speed controllers for use with fans are covered under Fan Speed Controllers (GQHG).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 507, "Electric Fans."

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FANS, ELECTRIC (GPWW)

USE AND INSTALLATION

This category covers fans and blowers intended to move air for the purpose of air circulation or ventilation. Also see Listings under Ventilators, Power (ZACT). Fans which include filters or means to control humidity or cool air are Listed under Air Conditioning Equipment – Air Filtering Appliances (AEDX), Air Conditioning Equipment – Humidifiers (AHIV) or Air Conditioning Equipment – Evaporative Coolers (AGNY).

This category covers dryer type fans used for drying carpets or floors.

This category covers rangehoods for permanent connection to the power supply or for cord-connection to the power supply. Accessory kits to adapt a rangehood that is intended for permanent connection to the power supply to a cord-connected rangehood are Listed under Rangehood Cord-Connection Kits (GQFM).

Fan type deodorizers and fan type air fresheners are Listed under Deodorizers and Air Fresheners (EOGX).

Fans intended to be mounted to a ceiling outlet box or ceiling building structure and whose blades rotate below the ceiling to move air are listed under Fans, Ceiling-Suspended (GPRT). Light kits for ceiling-suspended fans are Listed under Fans, Ceiling-Suspended (GPRT).

This category does not cover fans intended to be used in hazardous locations as defined by the National Electrical Code, or to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment.

This category does not cover air heaters incorporating fans, heating-ventilating units, or blowers comprising of such equipment as furnaces, mechanical-refrigeration equipment, or air conditioners.

Fans evaluated for use in barns, poultry houses, dairy barns or the like, as covered by Article 547 of the National Electrical Code, are marked "For Use in Agricultural Buildings" or with an equivalent statement.

Fans intended to be mounted over tubs or showers have been evaluated for such purposes and are marked "Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit."

Fans intended for mounting beneath a ceiling structure such as provided on porches or patios have been subjected to a rain test and are marked as being acceptable for such use.

Fans and accessories intended for permanent installation are provided with means for connection to permanent wiring systems.

Fans Listed in this category have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with Authorities Having Jurisdiction.

Fans intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components and are marked "Outdoor Use." Roof-mounted fans are investigated to determine the effect of rain on electrical components, but are not required to be marked for outdoor use. Gable-mounted attic fans are normally installed with shutters and are not subjected to a rain test; similarly, wall insert fans are not subject to a rain test, if marked to indicate that shutters are to be provided. Fans intended for mounting in interior walls or ceilings are marked to indicate the intended use, unless the design is such as to make the intended method of installation obvious.

Fans intended for use in damp location cooking areas have been subjected to a water spray test and are marked "Suitable for use in damp locations when installed in a GFCI protected branch circuit."

Fans and accessories intended for use over cooking equipment are investigated to determine the effect of grease on electrical parts. These units are for use over residential gas and electric ranges or ovens only and include hood fans intended for use over (but not mounted directly on) ranges, separate hoods provided with lights or other wiring and intended for use over ranges in conjunction with wall or ceiling insert fans, and oven ventilators for use over wall insert ovens.

Fans intended for use over eye level ranges have been investigated for use when mounted separately above a representative eye level range.

Some wall insert and ceiling insert fans have been investigated for use in conjunction with separate hoods over cooking equipment (see above) and are so marked.

Fans intended for mounting directly on cooking equipment are investigated in conjunction with the cooking appliance and Listed as a part of the accessory to the cooking appliance.

Filters provided on fans intended for use over cooking equipment are investigated with respect to flammability and smoke propagation.

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Fans installed in an area in close proximity to a stove, range or oven, where fumes, grease-laden air or the like may be present and intended to discharge air away from the cooking area, are intended to be installed in such a manner as to discharge the air to the exterior of the building and not into concealed walls or ceiling spaces or into the attic. Ductless fans intended for use in cooking areas are not required to discharge air to the building exterior.

Fan Speed Controllers sold separately from the fan are Listed under Fan Speed Controls (GQDU).

Ventilating hood fan shelves intended for use over ranges and incorporating a shelf or a compartment to accommodate a microwave oven are evaluated and marked for such use.

Ceiling-insert fan/light combinations are not evaluated for use in an insulated ceiling unless marked "Type IC – Inherently Protected" or "Type IC – Thermally Protected."

When an appliance consists of two or more subassemblies shipped separately, each subassembly or packaging is marked to indicate those other subassemblies that may be used to complete an assembly, if the installation is not obvious.

None of the fans covered in this category have been investigated for use over cooking appliances which use fuel.

RELATED PRODUCTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 507, "Electric Fans."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Fan," "Electric Fan," "Fan Accessory" or other appropriate product name.

FANS FOR SPECIFIC USE (GPZZ)

This category covers fans intended for use with specified manufacturers' Listed electric ranges. They are similar to "Fans, Electric" (GPWV) described in this directory except they are limited to installation with specific makes and models of household electric ranges as marked on the electric fan. All other conditions for their use and installation are the same as described for "Fans, Electric" (GPWV).

The Basic Standard for this product is Electric Fans, UL507.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

**CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
ELECTRIC FAN**

**FOR INSTALLATION ONLY WITH THE SPECIFIED HOUSEHOLD
ELECTRIC RANGES, MARKED ON THE PRODUCT**

FAN SPEED CONTROLS (GQDU)

Products covered under this subcategory are intended for controlling the speed of ceiling suspended fans. Classified controls are produced by a manufacturer other than the fan manufacturer and are evaluated for use with specific ceiling suspended fans. Each control is marked for use with the specific fan (manufacturer, model number or series) with which the control has been evaluated.

Additional markings may be provided on the control when provided with an auxiliary contact(s) for lamp load control and the maximum watt limitation for the lamp.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

**FAN SPEED CONTROLS
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.®
For Use With Ceiling Suspended
Fans (Company Name)
Model Numbers_____.**

**FLEXIBLE LIGHTING PRODUCTS
(ILGJ)**

USE

This category covers flexible lighting products intended for decorative use, consisting of nonreplaceable lamps connected in series/parallel strings and enclosed within a flexible polymeric tube or extrusion.

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Flexible lighting products are provided with an attachment plug for connection to a nominal 120 V, 15 or 20 A branch circuit. These lights should not be installed in a manner that can cut or damage the outer insulation, and should not be field cut but connected as a complete unit, unless indicated otherwise in the installation instructions.

This category also covers flexible light sculptures which are intended for decorative use and consist of a polymeric or rigid frame to which a flexible lighting product is attached. The flexible lighting product attached to the light sculpture provides outline lighting of the figure or object created by the frame.

This category also covers low voltage flexible lighting products which are intended for use with a low voltage transformer or power supply.

Flexible lighting products are intended for dry and indoor use unless marked for damp or wet locations.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2388, "Flexible Lighting Products."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Light" or "Flexible Light Sculpture."

GARAGE EQUIPMENT (JGWV)

USE AND INSTALLATION

This category covers electrically operated equipment, rated 600 V or less, intended primarily for use in servicing and repairing automobiles. Such equipment is intended to be used mainly in commercial garages and gasoline dispensing and service stations. Unless specifically marked for hazardous locations use, products are intended for use in an area that is considered unclassified based on the classification in the National Electrical Code, NFPA 70 (NEC).

Some of the equipment covered under this category incorporates parts that tend to produce arcs or sparks and, therefore, when installed in commercial garages and gasoline dispensing and service stations, should be in areas or enclosures suitable for the purpose in accordance with the provisions of the NEC. Products incorporating arcing or sparking parts located above 18 inches from floor level (i.e. in an area considered unclassified by the NEC) are provided with instructions which specify that the equipment is not to be installed in a recessed floor area. Products incorporating arcing or sparking parts located below 18 inches from the floor, such as dynamometers, are marked for use in a Class I, Division 2 location, or the equipment should be located where there is mechanical ventilation providing a minimum of 4 air changes per hour in accordance with Section 511-3 of the NEC. If the equipment is intended to be located below grade level, such as a pit, the product should be marked for Class I, Division 1, or should be located in an area with exhaust ventilation at a rate of 1 cfm/ft² of floor area at all times when the building is occupied or when vehicles are parked over the equipment. The exhaust should be taken from a point within 12 inches of the floor of the pit, in accordance with Table 514-2 of the NEC. In addition, consideration should be given to the surrounding area and its classification in accordance with the NEC. If reliance is placed on ventilation requirements, the installation instructions for the product should specify the necessary ventilation requirements, and the suitability of ventilation should be determined at the installation.

RELATED PRODUCTS

Automotive lifts are covered under Automotive Lifts (BACL). Automotive car washes are covered under Cleaning Machines, Miscellaneous (DMOU). Battery chargers are covered under Battery Chargers, Nonautomotive Type (BBML). Refrigerant recyclers and air conditioning charging stations are covered under Refrigerant Recovery/Recycling Equipment, Automotive (SCMA).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 201, "Garage Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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GAS DETECTORS, RESIDENTIAL AND RECREATIONAL VEHICLES (JKIS)

USE

This category covers gas detectors intended to detect natural gas and LP-gas (propane) which may be present in residential buildings or recreational vehicles as a result of gas leaking from gas-fired equipment. These devices are intended to sound an alarm at or below 25 percent of the lower flammable limit of natural gas or LP-gas (propane).

INSTALLATION

Installation limitations, if any, are marked on the device. Reference should also be made to the manufacturer's installation and use instructions accompanying the product.

These devices are not suitable for installation in hazardous locations as defined in the National Electrical Code, NFPA 70.

UNEVALUATED FACTORS

These devices have not been investigated as smoke or fire detectors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1484, "Residential Gas Detectors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Gas Detector" or "Recreational Vehicle Gas Detector."

HEALTH CARE FACILITIES EQUIPMENT (KEVQ)

GENERAL

This category covers appliances, utilization equipment and construction materials which have been judged to be particularly applicable to a health care facility as defined by Article 517 of NFPA 70, "National Electrical Code."

The general information under the specific categories indicate the areas in which the individual Listings are intended to apply in health care facility installations.

This equipment, unless otherwise indicated, is for installation in unclassified (ordinary) areas of health care facilities.

HOSPITAL GROUND JACKS AND GROUNDING CORD ASSEMBLIES (KEVX)

This listing covers hospital ground jacks and mating grounding cord assemblies intended for grounding equipment in a health care facility to a patient grounding point or other appropriate reference grounding point.

The basic standard used to investigate products in this category is UL467, "Electrical Grounding and Bonding Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Grounding Jack", "Grounding Cord Assembly", or other appropriate product name.

ISOLATED POWER SYSTEMS EQUIPMENT (KEWV)

These listings include isolated power centers which incorporate complete assemblies of isolation transformers and one or more isolated secondary circuits terminated in integrally mounted grounding type load receptacles in an overall enclosure which are intended for use in health care facilities where it is considered desirable to minimize available leakage and short-circuit currents.

Line isolation monitors may be included in the assembly to indicate the "condition" of the isolated circuit and its connected components with respect to electrical ground.

Other distribution panels listed as isolated power panelboards incorporate the same features as described above except that they may be sup-

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plied with power from a separate isolation transformer. They are connected by an approved wiring method to remote receptacles located in operating rooms or other anesthetizing location areas of health care facilities.

Accessory equipment, such as terminal assemblies located in patient care areas, are also included in these listings.

The basic standard used to investigate products in this category is UL1047, "Isolated Power Systems Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Isolated Power Systems Equipment".

ISOLATED POWER WALL MODULES (KEXS)

These listings include Isolated Power Wall Modular Sections for use in, within, or as part of, health care facilities, and may be part of a building structure. They are designed for permanent connection to the building wiring in accordance with the provisions of Article 517 of the National Electrical Code.

These sections incorporate factory installed wiring and equipment comprising part of an isolated power system such as the components of an isolated power center or an isolated power panelboard, or accessory equipment such as terminal assemblies located in patient care areas. In addition they may incorporate various combinations of gas outlets, lighting fixtures, elapsed time indicators, clocks, intercommunication equipment, etc.

These sections do not contain any grounded power systems except that necessary for connection to the primary of an isolating transformer, if provided. Sections which are intended for use with grounded power systems are Listed under the classification of Prefabricated Buildings and Assemblies, Sections and Units.

The pre-installed components and wiring of a prefabricated section may be concealed and except for the branch circuit connections, may not be accessible for inspection at the inspection site.

The isolated power wall module sections have not been investigated to determine conformance with one or more Model Building or Plumbing Codes. They have been investigated to determine compliance with the National Electrical Code. These wall modular sections are intended for installation subject to approval by the authority having jurisdiction.

The maximum available leakage current to the enclosure and primary grounded circuit conductor from either isolated circuit conductor has been investigated to determine that it is less than 100 microamperes with no loads connected to the isolated circuit.

Fire hazard classification of the building materials used in the wall module sections, including the resistance of any plywood to delamination under fire exposure, has been investigated. The fire hazard classification of the building materials used in prefabricated assemblies has the following maximum ratings applied to the finished panel and to core material (if used) in comparison with asbestos cement boards as zero and untreated red oak lumber as 100:

A. Flame spread rating 75

B. Smoke developed 200

See also general information under Isolated Power Systems Equipment, Guide KEWV.

The basic standard used to investigate products in this category is UL1047, "Isolated Power Systems Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Isolated Power Wall Module".

PREFABRICATED MEDICAL HEADWALLS AND MEDICAL SUPPLY UNITS (KEZR)

USE

This category covers prefabricated medical headwalls and medical supply units that are factory-built assemblies for use in, within, or part of health care facilities, and may be part of a building structure. These assemblies may incorporate pre-installed materials and Listed equipment which is usually concealed and may not be accessible for inspection at the installation site. The Listed equipment incorporated in these assemblies includes, but is not limited to, receptacles, switches, clocks, timing devices, patient monitors, vacuum stations and gas fittings.

These assemblies, including any field wiring for units that are not factory wired, are intended for installation subject to approval by the Authority Having Jurisdiction.

INSTALLATION CODES

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Materials, including the methods used for the installation of electrical, mechanical, heating, and plumbing equipment included in these assemblies by the manufacturer of the assemblies, have been judged under UL requirements which are based on the National Electrical Code, National Fire Code, and Model Building, Plumbing and Mechanical Codes.

RATINGS

The fire hazard of building materials employed in the assemblies is judged to be no greater than that of ordinary lumber used in site-constructed buildings. Finished surfaces are of materials having flame spread and smoke developed ratings of 200 or less. Products with a rating less than 200 indicated in the individual Listings may be included as part of the product marking.

Structural requirements vary with type of building construction and occupancy, and stability is to a large measure dependent upon the attachment of the assemblies to field-erected or existing structures. Therefore, Authorities Having Jurisdiction should be consulted with respect to local requirements.

RELATED EQUIPMENT

Prefabricated assemblies for use in locations other than health care facilities are covered under Prefabricated Assemblies, Sections and Units (QQXX) and Wiring Assemblies (QQYZ).

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in the National Electrical Code, NFPA 70.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name, such as "Medical Headwall," "Medical Supply Unit," "Dental Unit," or proprietary descriptive product name with further description where necessary.

One Listing Mark is applied to each assembly.

**MEDICAL AND DENTAL EQUIPMENT,
PROFESSIONAL (KFBQ)**

This listing covers equipment which, unless otherwise noted, is designed for professional use by personnel in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities.

This equipment has been investigated from the standpoint of electrical, fire, and accident hazards. Other hazards, including those which may result from use of this equipment in the presence of flammable anesthetics have not been investigated. The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, have not been investigated.

Some listings of Medical and Dental Equipment, Professional are predicated on the provision of one of two alternate attachment plug caps specifically referred to in the listing of "Attachment Plugs-Fuseless." One is a locking type cap identified by the marking "Hospital Only" and the other is a nonlocking type ANSI Standard configuration grounding type cap identified by the marking "Hospital Grade" and a green dot on the body of the cap. The identification is visible after installation on the flexible cord.

Baby incubators, and similar equipment for use with oxygen enriched atmospheres, have been investigated with respect to the increased hazard resulting from the presence of oxygen and electrical parts within the equipment. Motor operated beds are marked if they are suitable for use with oxygen. It is not possible to make devices such as these inherently safe from external sources of ignition. This hazard is greatly increased by the presence of oxygen, which makes materials easier to ignite and greatly increases the burning rate. Accordingly, for safety, it is essential that all possible sources of ignition be kept away from these devices. Possible sources of ignition against which precautions should be taken include open flames, matches, cigarettes, accumulations of static electricity, and reducing valves on oxygen tanks which occasionally project flame or sparks due to ignition or explosion of rubber valve seats.

Oil bath sterilizers and similar equipment have been investigated with respect to their use with oils such as are recommended by the sterilizer manufactures.

For listings of medical and dental equipment including refrigerated components, such as refrigeration therapy equipment, refer to Refrigeration Equipment.

Equipment which has been investigated to determine its suitability or safety for use where a flammable anesthetic is likely to be present may be found in Underwriters Laboratories Inc. Hazardous Location Equipment Directory under Medical Equipment.

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Household health care equipment is listed in the product category "Personal Hygiene and Health Care Appliances."

Heating pads are listed in the product category "Heating Pads, Electric."

The basic standard used to investigate products in this category is UL544, "Electric Medical and Dental Equipment".

This category also covers medical and dental equipment which is rebuilt by the original manufacturer or any other party that has the necessary facilities, technical knowledge, and skills.

Rebuilt medical and dental equipment is factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt medical and dental equipment is subject to the same requirements as new medical and dental equipment.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Medical Equipment", "Dental Equipment", or the name of the specific type of product as shown in the individual Listing or the word "Rebuilt" or "Remanufactured" followed by the following product names as appropriate:

"Medical Equipment", "Dental Equipment", or the name of the specific type of product as shown in the individual Listing.

**MEDICAL AND DENTAL EQUIPMENT,
PROFESSIONAL, DISPOSAL SYSTEMS
AND ACCESSORIES (KFBY)**

The function of these products as indicated by the manufacturer is to neutralize or collect biological or medical waste. These products are intended for use in hospitals, nursing homes, medical care centers, medical and dental offices and similar professional health care facilities. They include, but are not limited to syringe destroyers, waste disposers and similar equipment.

Approval to market these products in the United States is regulated by the Federal Food, Drug, and Cosmetic Act, P.L.94-295, and the Code of Federal Regulations, Title 21, Parts 800-895. Underwriters Laboratories investigation is, therefore, limited to Classification as to electrical fire, shock and mechanical hazards only. The environmental impact and health aspects associated with the use of these products and their ability to collect, identify, or neutralize biological and medical waste have not been investigated by UL. This limitation is specified in the instruction manual for all products covered under this category.

Unless otherwise noted, these products have not been investigated for use in the presence of flammable materials. Equipment which has been investigated to determine its suitability for use in hazardous locations as defined by the National Electrical Code may be found in Underwriters Laboratories Inc. Hazardous Location Equipment Directory.

The basic standards used to investigate products in this category are UL1262, "Laboratory Equipment" and UL430, "Waste Disposers". Equipment for use in the Patient Vicinity as defined in UL 544, "Medical and Dental Equipment" is also investigated to applicable requirements in UL 544.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories (shown below) on the product is the only method provided by Underwriters Laboratories to identify Medical and Dental Equipment, Professional Disposal Systems and Accessories which have been produced under its Classification and Follow-Up Service.

**PROFESSIONAL MEDICAL/DENTAL
DISPOSAL SYSTEM
CLASSIFIED
BY
UNDERWRITERS LABORATORIES INC. ®
AS TO ELECTRICAL SHOCK, FIRE
AND MECHANICAL HAZARDS ONLY.
OR
PROFESSIONAL MEDICAL/DENTAL
DISPOSAL ACCESSORY
CLASSIFIED
BY
UNDERWRITERS LABORATORIES INC. ®
AS TO ELECTRICAL SHOCK, FIRE
AND MECHANICAL HAZARDS ONLY.**

**MEDICAL WASTE DISPOSAL SYSTEMS,
EQUIPMENT AND ACCESSORIES (KFCC)**

GENERAL

This category covers products that neutralize or collect biological or medical waste as indicated by the manufacturer. These products are intended for use in hospitals, nursing homes, medical care centers, medi-

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cal and dental offices and similar professional health care facilities. They include, but are not limited to syringe destroyers, waste disposers and similar equipment.

Approval to market these products in the United States is regulated by the Federal Food, Drug, and Cosmetic Act, P.L. 94-295, and the code of Federal Regulations, Title 21, Parts 800-895. Underwriters Laboratories Inc.'s investigation is, therefore, limited to Classification as to electrical shock, fire and mechanical hazards only. The environmental impact and health aspects associated with the use of these products and their ability to collect, identify, or neutralize biological and medical waste have not been investigated by UL. This limitation is specified in the instruction manual for all products covered under this category.

Unless otherwise noted, these products have not been investigated for use in the presence of flammable materials. Equipment which has been investigated to determine its suitability for use in hazardous locations as defined by NFPA 70, "National Electrical Code" may be found in UL's Hazardous Locations Equipment Directory.

RELATED PRODUCTS

Additional Classifications are covered under Medical and Dental Equipment, Professional, Disposal Systems and Accessories (KFBY).

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 61010A-1, "Electrical Equipment for Laboratory Use: Part 1: General Requirements" and UL 430, "Waste Disposers."

Equipment for use in patient environments as defined in IEC 60601-1-1, "Medical Electrical Equipment, Part 1: General Requirements for safety, 1. Collateral standard: Safety requirements for medical electrical systems" is also investigated to applicable requirements in UL 2601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety."

Equipment intended for household use is also investigated to the applicable requirements in UL 1431, "Personal Hygiene and Health Care Appliances."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, the appropriate product name, and the statement: "AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY."

**POWER SUPPLIES FOR USE IN HEALTH
CARE FACILITIES (KFCG)**

USE

This category covers indoor use power supplies having input ratings not more than 600 V, direct and alternating current intended for use with professional medical and dental equipment in unclassified (ordinary) locations of a health care facility in accordance with NFPA 70, "National Electrical Code."

Power supplies not provided with standard output receptacles are marked for use with the intended end-use equipment, the combination of which has been evaluated for compliance with the relevant standards of this category as noted below. Consideration should be given for the combination of products to be evaluated under Medical Equipment (PIDF).

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

UNEVALUATED FACTORS

The investigation of a device covered under this category does not include the effects it may have on the system or equipment connected thereto.

RELATED PRODUCTS

Power supplies not provided with standard output receptacles and not marked for use with intended end-use equipment are covered under Power Supplies, Medical and Dental (QQHM2).

Power supplies intended to isolate the secondary output from ground are covered under Isolated Power Systems Equipment (KEWV).

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1012, "Power Units Other Than Class 2" and UL 544, "Medical and Dental Equipment" or UL 2601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety."

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UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Power Supply," "Power Conditioner," etc., preceded by "Hospital," "Health Care Facility," "Medical" or "Dental" as appropriate.

The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the above product name.

**TELEVISION/VIDEO EQUIPMENT FOR USE
IN HEALTH CARE FACILITIES (KFCV)**

This category covers power operated television and video equipment intended for entertainment purposes in ordinary locations of health care facilities. Equipment that has been found suitable for use in oxygen enriched atmospheres is so indicated in the listings.

Entertainment centers consisting of combinations of a television receiver and a radio receiver and/or other audio or video equipment are judged with respect to the requirements for television equipment.

Accessory equipment, including carts, stands, supporting arms and/or wall mounting brackets, intended for use with television and video equipment in health care facilities are also covered under this category.

The basic Standards used to investigate products in this category are UL 1409, Low-Voltage Video Products Without Cathode-Ray-Tube Displays; UL 1410, Television Receivers And High Voltage Video Products; UL 1492, Audio-Video Products And Accessories; and UL 6500, Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and or symbol of Underwriters Laboratories Inc (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "TV", "TV Stand", etc., preceded by either "Hospital" or "Health Care Facility".

**UNINTERRUPTIBLE POWER SUPPLIES
FOR USE IN HEALTH CARE FACILITIES
(KFFG)**

USE

This category covers indoor use uninterruptible power supplies which may be portable, stationary or fixed. The equipment is rated not more than 600 V, ac, intended for use with professional medical and dental equipment in ordinary locations of a health care facility in accordance with the National Electrical Code. Unless marked "Essential Electrical System," uninterruptible power supplies covered under this category have not been investigated with respect to the requirements for essential electrical systems as defined in the National Electrical Code, Article 517.

This category also covers Listed uninterruptible power supply equipment which is rebuilt by the original manufacturer or other parties having the necessary facilities, technical knowledge and skills. Uninterruptible power supply equipment is rebuilt by using new or reconditioned parts and is subjected to the same requirements as new products.

Uninterruptible power supplies provided with nonstandard output receptacles are marked for use with the intended end-use equipment.

An uninterruptible power supply (UPS) covered in this category is used to provide alternating current power to a load for a period of time marked on the unit in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

The investigation of a device listed in this category does not include the effects it may have on the system or equipment connected thereto.

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1778, "Uninterruptible Power Supply Equipment" and either UL 544, "Medical and Dental Equipment" or UL 2601-1, "Medical Electrical Equipment, Part 1."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Uninterruptible Power Supply," preceded by "Hospital," "Health Care Facility," "Medical" or "Dental," as appropriate.

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For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" additionally precedes the product name.

HEATERS AND HEATING EQUIPMENT (KKBV)

This category covers equipment rated over 300 V intended primarily for industrial or commercial installations.

Listings of appliances intended for use with conventional types of detachable heater cord sets may cover the appliance only.

Units suitable for outdoor installation are noted in the individual Listings. Units not designated as suitable for outdoor installation are for indoor use only.

AIR HEATERS, MOVABLE AND WALL-OR CEILING-HUNG (KKPT)

This listing covers cord and plug connected air heaters of the natural convection and fan assisted movable types, wall-hung (other than at the base board level), and ceiling hung types.

Movable and wall- or ceiling hung heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area.

Some movable and wall- or ceiling hung heaters may present fire hazards if they come in contact with combustible materials such as draperies, furniture, carpeting, bedding and the like or if they are covered or blocked in any manner. In accordance with product markings and instructions for the user, such heaters should be so placed as to provide safeguards against such contact and should not be located where they can be covered or blocked, for example at the baseboard level. Uses that do not result in a fire hazard, still may cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials.

Certain air heaters which have been subjected to the equivalent of a beating rain are considered to be acceptable for outdoor installation and are marked "Outdoor Use". All other heaters have been investigated for indoor use only.

Fixed and Location Dedicated Electric Room Heaters are Listed under a separate category "Air Heaters, Room, Fixed And Location Dedicated".

Permanently mounted heaters which have provisions for drawing in outside air are Listed as "Room Fan-Heater Units" under Heating, Cooling, and Ventilating Equipment.

Portable baseboard heaters and accessories are Listed under separate categories "Baseboard Heaters" and "Baseboard Heater Accessories" respectively.

These heaters have not been investigated for their acceptability when used in confined areas and operated at elevated temperatures for heat treatment or steam and dry bath applications. Steam and dry bath units are Listed under a separate category "Steam and Dry Bath Units".

The basic Standard used to investigate products in this category is UL 1278, "Movable and Wall- or Ceiling-Hung Electric Room Heaters."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and one of the following product names as appropriate: "Movable Heater", "Movable Fan Type Heater", "Wall-Hung Heater", "Ceiling-Hung Heater", "Wall- or Ceiling-Hung Heater", "Movable Radiant Glass Heater", "Movable Floor Mounted Air Heater", or other appropriate product name.

AIR HEATERS, ROOM, FIXED AND LOCATION-DEDICATED (KKWS)

This category covers electric air heaters of the fixed and location dedicated room type for residential, commercial and industrial applications. These heaters are of the radiant, natural convection and fan assisted types intended for mounting in various positions, such as on or in a wall, (except at the baseboard level), on, in or suspended from a ceiling or inserted in a floor. Combination units that include lights have been investigated with regard to their suitability for use as fixtures. Commercial-industrial types include heaters intended to be suspended from a ceiling or wall, or to provide an air curtain in a doorway.

Accessory equipment furnished as kits for field installation on heaters such as switch and thermostat assemblies, speed controllers, mounting brackets, and wall-insert enclosures are included within these listings.

These air heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area. These units have not been investigated for their acceptability when installed in confined areas and operated at elevated temperatures for heat treatment or steam and dry bath applications.

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Some air heaters may present fire hazards if they come in contact with combustible materials such as draperies, furniture, carpeting, bedding and the like or if they are covered or blocked in any manner. Such heaters are intended to be installed as to provide safeguards against such contact and should not be located where they can be covered or blocked, for example at the baseboard level. Installations that do not result in a fire hazard, still may cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials.

Certain room heaters have been evaluated for outdoor use and are specifically indicated by product markings.

All other heaters have been investigated for indoor installation only. The acceptability of such heaters when installed in semi-protected, or otherwise shielded locations is determined by the local inspection authority having jurisdiction.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electric Code must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment itself.

Steam and dry bath units are listed in a category of that name.

Movable and Wall- or Ceiling-Hung Heaters are Listed in a category of that name.

Heaters which have provisions for drawing in outside air are Listed as "Room Fan-Heater Units under Heating, Cooling, and Ventilating Equipment.

Listings of baseboard heaters and accessories appear respectively under Baseboard Heaters and Baseboard Heater Accessories categories.

The basic standard used to investigate products in this category is UL2021, "Fixed and Location-Dedicated Electric Room Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed, a control number, and " Room Heater", or other appropriate product name.

HEATERS, BASEBOARD (KLDR)

This listing covers space heaters of the portable and permanently mounted types intended to be positioned or installed on or in the wall at the baseboard level, or on the floor.

Baseboard heaters have been investigated and found to incorporate suitable safeguards against establishment of fire hazards that might result from contact with draperies, furniture, carpeting, bedding and the like; however, discoloration or scorching (but no glowing embers or flaming) may result on adjacent materials.

Heaters, other than those marked to indicate that they are not for residential use, have been investigated to determine that the accessible surface temperatures are low enough to reduce the likelihood of burns from accidental contact.

Electrical cords, drapes, and other furnishings should be kept away from baseboard heaters. To reduce the likelihood of cords contacting the heater, the heater is not to be located beneath electrical receptacles. Listings of receptacle accessories for use with an individual manufacturer's baseboard heaters are included under the category " Baseboard Heater Accessories" (KLQZ).

Baseboard mounted equipment consists of two types: Complete units intended for individual mounting in specific locations, and complete systems, which include accessories to enable the heating units to be interconnected around the perimeter of a room. Listings for accessories appear under Baseboard Heater Accessories. With reference to these systems, each manufacturer is required to furnish detailed instructions covering the assembly of the basic units and accessories, and indicating the method in which ground continuity is intended to be maintained between adjacent sections.

Electrical fittings are provided with each heater of a system to insure ground continuity between adjacent units and to protect interconnecting wiring, unless investigation shows that standard fittings which are available in the field will accomplish the same result.

A system which is factory furnished with all interconnecting wiring, fittings, raceways, etc., to complete the installation is considered suitable for connection to a single outlet branch circuit.

The basic standard used to investigate products in this category is UL1042, "Electric Baseboard Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Baseboard Heater".

Accessories, Baseboard Heater (KLQZ)

This category covers accessories intended to be used in conjunction with individual manufacturer's Listed baseboard heater systems (see Baseboard

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Heaters). Accessories include wiring components for interconnection of individual units, corner, blank and filler sections, to facilitate perimeter installation, temperature regulating components and other general and special use receptacle and switch components to be mounted in line with baseboard heater installations.

Attachment plug receptacle sections of baseboard heating systems provided for installation along with the other components of baseboard air heating systems, are intended to be supplied by means of conventional wiring methods, from separate branch circuits, not interconnected with the heating system.

Combination transfer switch-receptacle sections of baseboard heating systems which permit use of either the heating system by itself, or a separate room air conditioner by itself, are intended to be connected to a single branch circuit of appropriate size.

The basic standard used to investigate products in this category is UL1042, "Electric Baseboard Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Baseboard Heater Accessory".

CLOTHES DRYERS (KMEX)

GENERAL

This category covers clothes dryers intended for use only where water has been used as the cleaning agent. Unless specifically marked, the clothes dryers with the Listing Mark are intended for free standing installation with no spacing required between the back and any side to combustible wall surfaces but are not intended to be operated in closets, alcoves, or other confined areas, nor stacking one unit above another.

A wall insert clothes dryer is considered to be an appliance intended to be mounted permanently in a wall or other vertical surface of a building, or in a cabinet.

A recess clothes dryer is considered to be an appliance intended (1) to be supported by the floor, (2) to rest against a wall in the rear, (3) to rest against a wall, a cabinet, or another appliance on one side, and (4) to rest against a cabinet or other appliance on the other side. If the design permits, a counter top may cover the clothes dryer and the adjacent cabinets and appliances. A recess clothes dryer is not intended for permanent attachment to the building structure or to adjacent cabinets or appliances.

A wall insert clothes dryer is considered to be suitable for installation as a recess clothes dryer, or as a freestanding clothes dryer. A recess clothes dryer is considered suitable for installation as a freestanding clothes dryer.

Clothes dryers are provided with means of connection of the metallic parts of the enclosure to ground, and all clothes dryers intended for nominal 120-240 v. three wire operation may be provided with grounding facilities to permit the frame of the appliance to be connected directly to the neutral conductor in accordance with the provisions of NFPA 70, "National Electrical Code" (NEC).

Motor-overcurrent protection is included in motor operated dryers if adequate protection would not be provided by branch circuits to which they would properly be connected.

The normal use of clothes dryers creates a large volume of humid air which is sometimes vented to the room interior. Unless the appliance is properly oriented this moisture could affect electrical wiring or other electrical devices in the vicinity.

Provision should be made for the periodic removal of accumulation of lint which results from normal operation of this type of equipment.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, the necessary special instructions are provided on or with the equipment. An individual branch circuit should be provided for each clothes dryer.

Listed clothes dryer transition duct may be used to connect the clothes dryer to an existing permanent duct system provided as part of the building structure. Listed clothes dryer duct is covered under the category "Clothes Dryer Transition Duct."

The burglary and theft protection features of coin-operated machines have not been investigated, unless specifically indicated by a marking on the machine.

RELATED PRODUCTS

For dryers other than electrically heated types, see Dryers (LEFZ), Gas-fired Clothes Dryers, Type 1 (LETA) and Gas-fired Clothes Dryers, Type 2 (LETX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

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The basic standards used to investigate products in this category are UL 2158, "Electric Clothes Dryers" and UL 1240, "Electric Commercial Clothes Drying Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clothes Dryer."

Clothes Dryer Transition Ducts (KMIK)

Clothes dryer transition ducts are intended for venting the exhaust air of electric and gas clothes dryers of household or commercial type.

These ducts are intended for installation in accordance with the Installation Instructions provided with the product.

These ducts are rigid or flexible metal types. Flexible types are a maximum 8 ft. long for use in single lengths only. These ducts are intended for use only in connecting a clothes dryer to permanent ducting provided as a part of the building structure.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "LISTED", a control number, and the following product name: "Clothes Dryer Transition Duct."

Laundry Equipment Accessories Classified for Use in Specified Equipment (KMKD)

The products covered in this category are investigated for use with household clothes dryers of the electric and gas type. The basic standards used to investigate products in this category are Subject 2365, "The Outline of Investigation for Laundry Equipment Accessories", the "Standard for Electric Clothes Dryers", UL 2158, and the "ANSI Standard for Gas Clothes Dryers", Z21.5.1.

Refill kits intended to replace disposed components of the accessory are investigated for use with the basic product.

Laundry equipment accessories for installation on specific models of laundry equipment are Classified under the category Laundry Equipment Accessories, Classified for Use in Specified Equipment (OOWK)

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory); "Clothes Dryers Accessory"; "FOR USE IN HOUSEHOLD ELECTRIC OR GAS DRYERS"; and a control number.

Refill kits for the product that are intended to treat dry-clean clothing in household clothes dryers are marked with the Classification Marking which includes: the UL symbol; the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory); "Clothes Dryer Refill Kit"; "FOR USE WITH CLASSIFIED CLOTHES DRYER ACCESSORIES FOR USE IN HOUSEHOLD ELECTRIC OR GAS DRYERS"; and a control number.

CONTROL PANELS, REMOTE, FOR ELECTRIC DUCT HEATERS (KMLW)

This listing covers electrical panels incorporating control and/or overcurrent protective devices intended specifically for remote use with electric duct heaters. Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Sec. 424-22(c) of the National Electrical Code.

Unless otherwise specified in the manufacturer's installation instructions, these panels are intended to be mounted remote from the electric duct heaters, in a location where they will not be affected by heat or condensation from operation of the equipment.

The proper installation of these panels requires careful consideration of the individual manufacturer's installation instructions and wiring diagrams.

General purpose panels are not limited to use with specific makes and models of electric duct heaters. These panels are provided with installation instructions and wiring diagrams showing supply connections, connections to the electric duct heaters, and control circuit connections to be completed at the time of installation.

For general purpose panels containing only overcurrent protective devices or only magnetically operated switching devices, see Listings under "Panelboards" or "Industrial Control Equipment," respectively.

Panels to be used only with specific Listed equipment will be so identified and the equipment marked to require the particular panel. The instal-

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lation instructions and wiring diagrams for these panels may be provided with the panel or may be provided only with the Listed electric duct heaters.

The basic standard used to investigate products in this category is UL1996, "Electric Duct Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "General Purpose Control Panel for Electric Space Heating Equipment" or "Control Panel for Specific Electric Space Heating Equipment" — See equipment nameplate and installation instructions".

HEATERS, COOKING APPLIANCES (KMSV)

Commercial Cooking Appliances (KNGT)

This category covers cooking equipment intended for commercial indoor use, such as coffee machines, espresso coffee makers (single or grouped dispensers), conductive cookers, food warmers including heated food servers, fryers, griddles, nut warmers, ovens, popcorn machines, steam kettles, ranges, and other appliances for use in commercial kitchens, restaurants, or other business establishments where food is dispensed.

For similar types of gas-fired food service equipment intended for commercial use, see Gas-Fired Food Service Equipment (LGQX) in the Heating, Cooling, Ventilating and Cooking Equipment Directory.

If a product is suitable for built-in installation, side-by-side mounting or stacking, it is indicated in the installation instructions.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Appliances listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked "Use copper wire only for power supply connections."

Commercial cooking equipment should be installed in accordance with the recommendations of the National Fire Protection Association's Standard NFPA 96 "Ventilation Control and Fire Protection of Commercial Cooking Operations". Any integral ventilation or recirculating equipment provided with equipment covered in this category has not been evaluated with respect to the requirements of NFPA 96. For equipment which has been evaluated with respect to NFPA 96, see Commercial Cooking Equipment with Integral Recirculating Systems (KNKG).

Commercial cooking appliances of certain types are designed for permanent connections to water supply and sewer lines at the point of installation. Local authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

Certain appliances Listed in this category have also been investigated for use aboard marine vessels over 65 ft in length as covered by: USCG, Electrical Engineering Regulations Subchapter J, CG-259, (46CFR Parts 110-113). Such appliances are identified by a "Marine" Listing Mark for vessels over 65 ft in length.

This category also covers rebuilt commercial cooking equipment. Rebuilt equipment is factory rebuilt to the extent necessary using new or reconditioned component parts. Rebuilt commercial cooking equipment is subjected to the same requirements as new commercial cooking equipment.

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances".

Appliances Listed in this category with an integral cooking oil filter have been additionally investigated to the requirements in the standard "Commercial Filters for Cooking Oil", ANSI/UL 1889. For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF) in this Directory.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Commercial Cooking Appliance", "Cooking Appliance", or other appropriate product name. For rebuilt equipment the product name includes the word "Rebuilt".

Commercial, with Integral Recirculating Systems (KNKG)

This category covers cooking equipment intended for commercial use, such as deep fat fryers, griddles and other appliances for use in commercial

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cial kitchens, restaurants, or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral recirculating system.

Integral recirculating systems of the appliances consist of a fan, collection hood, and an air filtering system consisting of a grease filter, and may incorporate other air filtering devices. These systems incorporate an automatic fire extinguisher unit which has been evaluated with the cooking equipment section.

Integral recirculating systems are intended for venting captured and filtered air back into the room in which the equipment is located. These products are not intended for connection to a ducted exhaust system.

For products that are intended for installation with ducts, refer to Exhaust Hoods with Exhaust Dampers (YXZR), Exhaust Hoods Without Exhaust Dampers (YYCW) and Grease Extractors For Exhaust Ducts (YYMZ).

Recirculating Systems which are separated from commercial cooking appliances are covered under the category Hoods, Recirculating Systems, For Use With Specified Commercial Cooking Appliances (YZCT).

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warning or special instructions are marked on the equipment.

Appliances Listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked "Use Copper Wire Only For Power Supply Connections."

Commercial cooking appliances of certain types are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

The basic requirements used to investigate products in this category are Standard ANSI/UL 197, "Commercial Electric Cooking Appliances" and UL197 Supplement SB - "Commercial Electric Cooking Appliances with Recirculating Systems".

Appliances Listed in this category with an integral cooking oil filter have been additionally investigated to the requirements in the standard "Commercial Filters for Cooking Oil", ANSI/UL 1889. For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF) in this directory.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Commercial Cooking Appliance", "Cooking Appliance", or other appropriate product name, along with the words "With Integral Recirculating Systems (or Ductless Hood)".

Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)

This category covers cooking equipment intended for commercial use, such as pressurized deep fat fryers and other appliances for use in commercial kitchens, restaurants or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral system feature to limit the emission of grease-laden air from the cooking process to the room ambient.

These appliances have been evaluated for the limit of 5 mg/m³ for the emission of grease-laden air to the room ambient in accordance with the recommendations of the National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA96, using the EPA-202 test method prescribed for cooking appliances provided with integral recirculating air systems.

These products are not intended for connection to a ducted exhaust system.

Appliances in this category are not provided with an integral fire extinguishing system. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to fire extinguishing systems, such as the need for field installed systems in accordance with NFPA 96.

For products with integral recirculating systems including fire extinguishing systems, refer to Commercial, with Integral Recirculating Systems (KNKG).

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable warning or special instructions are marked on the equipment.

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Appliances Listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked "Use Copper Wire Only For Power Supply Connections".

Commercial cooking appliances of certain types are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

The basic requirements used to investigate products in the category are Standard ANSI/UL 197, "Commercial Electric Cooking Appliances".

Appliances Listed in this category with an integral cooking oil filter have been additionally investigated to the requirements in the standard "Commercial Filters for Cooking Oil", ANSI/UL 1889. For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF) in this directory.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and one of the following product names as appropriate: "Commercial Cooking Appliance," "Cooking Appliance," or other appropriate product identity specified in the individual Listing, along with the words "with integral system for limiting the emission of grease-laden air."

Custom-built Food Service Equipment (KNNS)

This category covers custom-built commercial food serving and/or cooking equipment that includes various combinations of electric broilers, food warmers including heated food servers, fryers, griddles, ranges, ovens, lighted and/or heated food displays, shelf heaters, plate warmers, convenience receptacles, and the like. It may also include refrigerated beverage cooler/dispensers, drinking water coolers, freezers, ice makers, ice cream makers, refrigerators, soda fountain units, and the like.

INSTALLATION

Custom-built food service equipment has been evaluated for installation in accordance with the National Electrical Code, NFPA 70 (NEC) and the recommendations of NFPA 96, "National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

Certain types of custom-built food service equipment are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

INSTALLATION INSTRUCTIONS

Custom-built food service equipment of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each section may bear a "Custom-built Food Service Equipment Section" Listing Mark and is marked "Section ____ of ____." The first blank space is filled with the number of the section. The second blank space is filled with a number indicating the total number of custom-built food service equipment sections that constitute the complete custom-built food service equipment. The custom-built food service equipment has installation instructions describing or illustrating the proper assembly, mounting and connection of the numbered custom-built food service equipment sections. The acceptability of the assembly of the sections in the field rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

This equipment includes factory-built assemblies incorporating pre-installed materials and components which after installation are usually concealed and may not be accessible for inspection at the installation site. Electrical connections made during installation, other than supply connections, are identified by markings on the product.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Equipment in this category is suitable for wiring with either copper or aluminum power supply conductors unless marked "Use copper wire only for power supply connections."

UNEVALUATED FACTORS

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared or served by use of this equipment has been investigated.

RELATED PRODUCTS

For refrigerated food service equipment without food heating functions, see Refrigeration Equipment (SCER).

For gas-fired food service equipment intended for commercial use, see Gas-fired Food Service Equipment (LGQX).

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ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 197, "Commercial Electric Cooking Appliances" and ANSI/UL 471, "Commercial Refrigerators and Freezers."

Appliances in this category with an integral cooking oil filter have been additionally investigated to the requirements in ANSI/UL 1889, "Commercial Filters for Cooking Oil." For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with word "LISTED," a control number, and the product name "Custom-built Food Service Equipment" or "Custom-built Food Service Equipment Section," or other appropriate product name related to commercial preparation/serving of food such as "Food Kiosk" or "Food Service Work Table."

Filters for Cooking Oil, Commercial (KNRF)

This category covers filters rated 600 volts or less for cooking oil, and intended for commercial use.

Oil filters covered by this Listing filter the cooking oil used in deep fat fryers usually found in commercial kitchens, restaurants, or other business establishments where food is prepared. These filters include a pump and may include an integral oil heater. This Listing includes portable filters and fixed filters whether intended for use with a specific fryer or fryers or for general use.

For cooking oil filters that form an integral part of another appliance, see Commercial Cooking Appliances (KNGT); Commercial, with Integral Recirculating Systems (KNKG); Commercial, with Integral Systems for Limiting the Emission of Grease Laden Air (KNLZ); Custom Built Food Service Equipment (KNNS); Commercial Cooking Appliances (LBOZ) or Gas-Fired Service Equipment (LGQX).

Filters suitable for built-in installation, side-by-side mounting or stacking are indicated in the installation instructions for the filter.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Appliances listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked "Use copper wire only for power supply connections" or the equivalent.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared using filtered oil from these appliances has been investigated.

The basic standard used to investigate products in this category is UL 1889, "Commercial Filters for Cooking Oil."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name: "Commercial Filter for Cooking Oil", or other appropriate product name.

Household Cooking Appliances, Classified (KNSY)

GENERAL

This category covers household cooking appliances intended for use on standard electrical distribution systems utilizing other than NEMA configuration wiring devices.

The appliances are rated 250 V ac or less, 50-60 Hz. Their only construction difference from appliances Listed under Household Cooking Appliances (KNUR) is the provision for a nonstandard configuration plug and cord, suitable for use on the electrical distribution system for which the appliance is intended. The appliance may be provided with a detachable or nondetachable cord set. The cord or the cord set is one of those styles recognized by Table 400.4 of NFPA 70, "National Electrical Code," or one of the harmonized (HAR) types. The power supply cord or cord set is certified by an agency applicable to the country in which the appliance is to be sold.

The markings on the appliance and the literature provided with the appliance are in English and may also be in another language.

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1026, "Electric Household Cooking and Food Serving Appliances," UL

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1082, "Household Electric Coffee Makers and Brewing-Type Appliances" and UL 1083, "Household Electric Skillets and Frying-Type Appliances."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or carton is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), one of the following product names as appropriate: "Bun Warmer," "Corn Popper," "Griddle," "Coffee Maker," "Household Cooking Appliance" or the specific type of product as shown in the individual Classifications, "AS TO FIRE, SHOCK AND CASUALTY HAZARD," and a control number.

Household Cooking Appliances (KNUR)

These listings cover appliances intended for household use which are designed to be employed in the application of heat to food products during cooking or warming processes involved in their preparation for human consumption.

Neither the toxicity of coatings nor the physiological effects consuming food prepared by use of these appliances has been investigated.

In cases where the nature or construction of equipment is such that special safety precautions beyond the requirements of the National Electrical Code must be observed in installation or use of the appliances, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

Range and range components intended for separate installation in kitchen cabinets or walls, such as built-in surface unit assemblies and ovens are listed under "Ranges, Household Electric." (KRMX), Microwave ovens are listed under Microwave Cooking Appliances (KQSQ).

The basic standards used to investigate products in this category are UL1026, "Electric Household Cooking and Food Serving Appliances"; UL1082, "Household Electric Coffee Makers and Brewing-Type Appliances"; and UL1083, "Household Electric Skillets and Frying-Type Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Bun Warmer", "Corn Popper", "Griddle", "Coffee Maker", "Household Cooking Appliance", or the name of the specific type of product as shown in the individual Listings.

DE-ICING AND SNOW MELTING EQUIPMENT (KOBQ)

This category covers fixed outdoor electric de-icing and snow melting systems for use in accordance with Article 426 of the National Electrical Code. The equipment is provided with means for permanent wiring connections, except that equipment rated 20A or less and 150V ac or less to ground may be of cord and plug connected construction.

To supplement the general requirements in the National Electrical Code, the manufacturer is required to provide with the units or mats, specific installation instructions concerning any limitations of the installation and/or use of the equipment. The instructions for mats or cable units intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used.

For Listing of pipe heating cable see "Pipe Heating Cables" (KQUF).

The basic requirements for products in this category are contained in the Subject 1588 Outline Of Investigation.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "De-icing and Snow-Melting Equipment".

DUCT HEATERS, ELECTRIC (KOHZ)

Duct heaters are intended for installation in noncombustible ducts and are designed to be used individually and in groups as supplementary heat sources in hot air heating systems or as primary heat sources with separate blowers where the available heat from the duct heaters is sufficient to take care of local conditions.

Duct heaters which are suitable for outdoor installation are so marked. Heaters not marked as suitable for outdoor installation are for indoor use only.

In duct heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than

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60 amps. The overcurrent protective devices are either included as an integral part of the heater or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the heater is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with Electric Duct Heaters, see "Control Panels, Remote, for Electric Duct Heaters (KMLW)". Other Listed separate assemblies, as referenced on the duct heater marking, may also be used.

Each duct heater incorporates integral limit controls which are intended to protect against abnormal operating conditions which might arise from blocked inlets, blocked outlets, or fan failures. Magnetically operated switching devices or similar components required for use with these limit controls are either included as an integral part of the heater or are furnished as a separate assembly as described in the preceding paragraph. Supplementary controls, are not necessarily supplied as part of the duct heater.

A separate room thermostat must be provided to control the room air temperatures. For listings of thermostats and similar devices, see Temperature Indicating and Regulating Equipment (XAPX) in the Electrical Construction Equipment Directory. Provision for an interlock circuit, to assure operation of the separate blower when the duct heater is energized, is included in the heater or in the separate assembly as described above.

The proper installation of these heaters requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the number of heaters employed, the volume of air passing through the heaters, and the ambient temperatures and source of the air on the input side of the heater installation.

The air duct system should be installed in accordance with Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems No. 90A; Warm Air Heating and Air Conditioning Systems, No. 90B.

The manufacturer's application and installation instructions which are furnished with each heater should be consulted to determine the factors applicable to the particular installation, including required distances between the heater and turns in the duct, changes in duct sizes, air filters, humidifiers, etc. Unless these instructions specify other distances, for horizontal or upflow installations, (1) turns in the duct on the inlet side of the heater should be located at least 4 feet from the heater, (2) turns in the duct on the outlet side of the heater should be located at least 2 feet from the heater and (3) changes in duct sizes, air filters, humidifiers, etc. should be located at least 4 feet from either side of the heater.

Unless specifically indicated in the individual listings as "Suitable for zero clearance installation" the duct heater units should be installed in ducts with the clearances to combustible materials as specified in the manufacturers installation instructions and marked on the duct heater unit itself. Care should be taken to ensure that duct heaters are positioned properly (horizontal air flow or vertical air flow) since required clearances are affected by the position of the duct work in some instances.

Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit and ducts.

Tests have indicated that no adverse thermal effects are obtained when duct heaters marked to indicate that they are suitable for use with heat pumps, or central cooling air conditioners or fan-coil units are installed with certain of these units [See Heating And Cooling Equipment (LZFE)] provided the duct heater is used only in horizontal or upflow systems, and the duct heater is located downstream at least 4 ft from the nearest surfaces of the heat pump, central cooling air conditioner, or fan-coil unit.

The basic standard used to investigate products in this category is UL1996, "Electric Duct Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Duct Heater".

FURNACES, ELECTRIC CENTRAL HEATING (KOVX)

This Listing covers electrically operated central heating furnaces intended for use in space heating application in homes and other types of buildings, including mobile homes and travel trailers, as indicated in the manufacturer's installation instructions.

In furnaces rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the furnace or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the furnace is marked to specify that it is to be used with that particular separate assembly. For

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such separate assemblies which are specifically recognized for use with Electric Central Heating Furnaces, see "Control Panels, Remote, for Electric Space Heating Equipment" in the Electrical Appliance and Utilization Equipment List. Other Listed separate assemblies, as referenced on the furnace marking, may also be used.

In furnaces employing two or more motors or a motor and electric heater operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker having a rating that does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is to be protected only by the type of protective device specified.

Furnaces which have been investigated and found suitable for installation at least 4 ft downstream from air conditioners are so identified on the published printed cards and by the marking or instructions provided with the furnace.

Warm-Air Furnaces have provision for connection to a duct system except furnaces intended only for installation in a single story residence need not have provision for connection of a return air duct.

The air duct system of warm air furnaces should be installed in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilating Systems, No. 90A, and for Warm Air Heating and Air Conditioning Systems, No. 90B. When installed in mobile homes or recreational vehicles, reference should be made to the Department of Housing and Urban Development Manufactured Home Construction and Safety Standard or to the National Fire Protection Association Standard For Recreational Vehicles, No. 501C, respectively.

Each electric central heating furnace is provided with an individual marking and instructions which indicates if a noncombustible floor material is required, the necessary clearances to combustible constructions, proper installation in an alcove or closet, and the total free area of the air openings (if required) into a closet area. The clearances are the minimum required to avoid overheating; additional clearances may be required for accessibility.

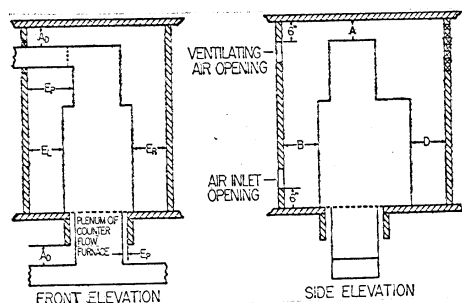
This information also appears on printed cards, published by Underwriters Laboratories Inc., and available from the manufacturer.

A furnace is tested for a "typical installation clearance" as described below. Each clearance is indicated on the published printed cards by appropriate symbols and dimensions. A furnace may be tested for installation in a room which is large in relation to the size of furnace, or for installation in a closet or alcove. If a furnace tested for an alcove or closet installation is installed in a room which is large in relation to the size of the furnace, it may be installed at the minimum clearances specified for closets and alcoves.

Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

Attic type furnaces are so indicated on the published printed cards. Such furnaces are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided with the furnace.

A furnace installation is indicated as follows:



Description of dimension symbols and abbreviations.

A — Clearance above top of furnace casing, bonnet, or plenum.

A(D) — Clearance from portion of horizontal warm-air duct within 3 ft of plenum unless a shorter distance is specified by furnace marking.

B — From front of furnace. Prefix "C" to numeral indicates suitability for closet or alcove installation; prefix "A," suitability for alcove installation but not for closet.

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D — From back of furnace.

E(L) — From left side of furnace.

E(R) — From right side of furnace.

E(P) — From any side of furnace plenum (downflow furnaces have plenum beneath furnace). "E(P)" is only specified for furnaces to be equipped with external plenums for connection to duct systems; its omission indicates furnace equipped with integral plenum and if furnace is otherwise installed, clearances specified are not valid.

F — Indicates type of flooring; "NC" for noncombustible; "C" for combustible. Numeral indicates minimum clearance below suspended appliances to combustible material.

G — Total minimum free area in square inches of air openings into a closet.

Furnaces consist of one or more factory made sections. Equipment provided in more than one section, is designed for field interconnection of matched sections to make the complete assembly. The individual sections which comprise the assembly are identified on the published printed cards and by a cross-reference marking on at least one of the sections. Similar sectionalized units are also covered under the Fan Unit category (LZSY) in this Directory.

Furnaces which have been investigated and found suitable for use with a field-installed refrigerant coil are so identified on the published printed cards and the refrigerant coil (s) intended for such use are identified by a marking on the furnace. Tests of furnaces with these field-installed coils intended for cooling, or with integral factory-installed coils intended for cooling, have indicated no adverse effects on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to a condensing unit of a central cooling air conditioner has been evaluated only for those specific combinations identified in separate Listings of Air Conditioners, Central Cooling in this Directory or for those specific condensing units identified by a marking on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to an outdoor section of a heat pump has been evaluated only for those specific combinations identified in separate Listings of Heat Pumps in this Directory. The effect of refrigerant heating on the furnace has not been evaluated for other combinations.

The basic standard used to investigate products in this category is UL1096, "Electric Central Air-Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electric Central Heating Furnace" or "Section of Electric Central Heating Furnace".

HEATERS, SAUNA AND STEAM BATH (KPJV)

This Listing covers bath heating equipment with sub-categories of Sauna Heating Equipment and Steam Bath Equipment. These bath heaters have not been investigated to determine their suitability for use as air heaters. See the categories Air Heaters, Moveable and Wall-or Ceiling-Hung (KKPT) and Air Heaters, Room, Fixed and Location-Dedicated (KKWS) for such equipment.

Sauna Heating Equipment (KPSX)

This Listing covers heating equipment intended for concentrated heating at elevated temperatures in relatively confined areas with or without the addition of moisture.

Particular attention should be paid to the heater installation restrictions, such as warning markings, remote thermostats and control installations, guards, minimum size of room, and distance from adjacent surfaces which are marked on the heater.

Factors such as the physiological effects of heat, reduced ventilation, and other conditions which may be found within the room where the heater is installed, have not been investigated.

The equipment listed in this category are intended for permanent connection to the supply source except for some sauna heater-room combination units which may be cord connected as specifically indicated.

For listing of steam bath equipment, see "Steam Bath Equipment" (KQBZ).

The basic standard used to investigate products in this category is UL875, "Electric Dry Bath Heater".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of the Directory) together with the word "LISTED", a control number and "Sauna Heater", "Sauna" or other appropriate product name.

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Steam Bath Equipment (KQBZ)

This Listing covers steam bath generators combination room and steam generator systems, and steam bath cabinets intended for high humidity concentrated heating at elevated temperatures for personal bathing.

Steam bath equipment accessories, such as gangable steam units, timer options, and drain options, are also included in these listings. The accessories covered in this section are Listed for installation only on Listed equipment as designated in the individual Listings of the equipment and accessory. The accessories are intended primarily for field-installation, but may be factory-installed.

Information concerning field wiring connections, mounting location, installation clearances, end-use equipment catalog numbers, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

Particular attention should be paid to installation instructions of the steam generator and markings on the product for restrictions, such as minimum distances to adjacent surfaces, valving of the steam outlet, etc.

Factors such as physiological effects of heat, reduced ventilation, and other conditions that may be found within the room where the steam is discharged or where the steam bath is installed, have not been investigated.

Steam generators Listed in this category have not been investigated for their suitability as a source of steam for space-heating purposes or for industrial or commercial use.

For Listing of sauna heating equipment, see "Sauna Heating Equipment" in this directory.

For steam generators for industrial or commercial use, see "Heaters, Industrial and Laboratory" in this directory.

The basic standard used to investigate products in this category is UL499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product, or on the smallest unit container in case of an accessory, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Steam Bath Heater", "Steam Bath Equipment", "Steam Bath Cabinet", "Shower/Steamer Unit", or other appropriate product name.

IMMERSION TYPE LIQUID HEATERS, INDUSTRIAL (KQGV)

This Listing covers immersion type liquid heaters for heating water-based liquids. The corrosion resistance of the immersed parts has been investigated on the basis of water. The degree of corrosion resistance to acidic, alkaline, etc., water-based liquids may vary depending on the material and/or coating on the immersed parts and the type and strength of the solution. Heater manufacturer's information is to be consulted in selecting a heater for an application.

Through-the-wall heaters must be operated only while the heating element is completely immersed in a water-based liquid. Other immersion type liquid heaters, must be immersed to a depth as marked on the product or as indicated in installation and use instructions.

The heaters incorporate a temperature limiting device which responds to the temperatures created by the heater; or the heater is marked to specify that a low liquid level cutoff control is to be installed and connected to de-energize the heater upon a low liquid level condition.

Heaters intended to be installed through the wall of a vessel have means for permanent wiring connections to the electrical supply. Other immersion type liquid heaters may have either a power supply cord for cord and plug connection or provision for permanent wiring connections to the electrical supply.

The basic standard used to investigate products in this category is UL 499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Immersion Type Liquid Heater."

HEATERS, INDUSTRIAL AND LABORATORY (KQLR)

Heating appliances of the following general types appear in this section: Branding irons, Brazers, Dental laboratory heaters, Electric kilns, Etchers, Glue pots, Heat guns, Heating cables, Hot plates, Incubators : Air flow, Water, Laboratory furnaces and dryers, Mobile drying ovens, Soldering guns and irons, Soldering stations and tools, Vacuum ovens, Water baths.

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Portable electric heating devices of soldering iron type present certain inherent hazards. The temperatures necessary for their normal use are high enough to cause fire if they are left in contact with combustible materials.

Infra-red heating equipment has not been investigated for use in hazardous locations, as defined in the National Electrical Code.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment itself.

In the following listing of industrial and laboratory hot plates, ovens, or other similar products, the explosion and fire hazard involved in the heating of chemicals has not been investigated.

Vapor degreasers are intended for use only with the specific cleaning fluids. Adequate ventilation is required for this equipment and the manufacturer's installation and operation instructions should be followed. The physiological effects of the cleaning fluids intended for use with the degreasing equipment have not been investigated by Underwriters Laboratories Inc.

Steam generators and boilers listed in this category are required to be provided with tanks built in conformance with the ASME Boiler Construction Code, and suitable pressure relief mechanisms. Water temperatures are not limited to a maximum of 90 C.

An explosion hazard may exist in steam generators because of the accumulation of oxygen and hydrogen in an unvented system which is operated under stand-by conditions for long periods of time, or to which condensate is returned. Suitable venting devices should be installed and such systems should be purged frequently.

The steam generators and boilers have not been investigated for their suitability as a source of hot water or steam for space-heating purposes.

The basic standard used to investigate products in this category is UL499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Laboratory Hot Plate", "Soldering Iron", "Laboratory Incubator", "Water Bath", "Branding Iron", or the name of the specific type of product as shown in the individual Listings.

MICROWAVE COOKING APPLIANCES (KQSQ)

This category covers cooking equipment incorporating one or more microwave generators operating in the normal ISM bands of 915 + or - 25 and 2450 + or - 50 megahertz.

The appliances are intended for household or commercial use in ordinary locations in accordance with the National Electrical Code. In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances have been investigated.

All microwave cooking appliances, cord connected and permanently connected, have provision for being properly grounded.

This category includes portable and stationary microwave cooking appliances employing resistive-type heating elements for baking, broiling, browning, convection cooking, or similar operations.

This category also includes combination microwave oven vent hood fans, and kits for converting counter top units to built-in, under-cabinet, wall-mounted or similar installations.

Products specifically designed for field installation in or on a microwave cooking appliance or to adapt a microwave cooking appliance from one type of installation to another are covered in this category under the individual listing and are marked to identify the microwave cooking appliance(s) with which they have been investigated.

Counter-top and under-cabinet mounted units have been tested individually in two sided right-angle alcoves. Products that have been investigated and found suitable for some other type of usage, such as built-in installation, side-by-side mounting, stacking or field installation over electric or gas ranges are identified for such usage by installation instructions, product markings, or both.

Units that have been investigated and found suitable for installation above a range or counter mounted cooking unit are identified for such installation and the minimum acceptable vertical clearance between the microwave cooking appliance and the range or counter mounted cooking unit is specified in instructions, product markings, or both.

Household electric ranges and built-in ovens incorporating a microwave cooking feature are Listed under Ranges, Household Electric category.

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Listed microwave cooking appliances have been evaluated to demonstrate that the microwave radiation emission is within the limitations prescribed by the U.S. Dept. of Health and Human Services, Food and Drug Administration, Center for Devices and Radiological Health.

Listed microwave cooking appliances are provided with a marking indicating whether they are intended for household use, commercial use, or both.

Only those microwave ovens bearing the Marine Listing Mark or the Marine Listing Mark with the statement "For Use Only On Vessels Over 65 Ft." have been investigated to determine the suitability of the microwave oven in a marine environment such as aboard boats or ships. See also guide EJOY in the Marine Products Directory.

The basic standard used to investigate products in this category is UL 923, "Microwave Cooking Appliances".

This category also covers microwave cooking appliances which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt microwave cooking appliances are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt microwave cooking appliances are subject to the same requirements as new microwave cooking appliances.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names "Microwave Oven", "Microwave Food Warmer", "Microwave Cooking Appliance", "Microwave/Oven Vent Hood Fan", or other appropriate product name indicated in the individual Listings.

The Listing Mark for rebuilt microwave cooking appliances additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

PIPE HEATING CABLE (KQUF)

GENERAL

This category covers electric heating cable designed to be secured to pipes to reduce the likelihood of freezing or to facilitate flow of viscous liquids. Some units incorporate a thermostat that automatically turns on the heating cable when the temperature drops below a predetermined value.

Pipe heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Information is provided, either as marking on the cable or in the installation instructions, as to the intended application of the heating cable. The Listings appear separately under the following subcategories: Mobile/Manufactured Home Pipe Heating Cable (KQUV), Pipe Heating Cable, Industrial and Commercial (KQXR) and Residential Pipe Heating Cable (KQYI).

The ability of heating cable to maintain temperatures of liquids in pipes depends upon ambient temperature conditions and has not been investigated.

RELATED PRODUCTS

For de-icing and snow melting equipment, see the category of the same name (KOBQ).

Mobile/manufactured Home Pipe Heating Cable (KQVU)

USE AND INSTALLATION

This category covers electric heating cable intended to reduce the likelihood of water freezing in exposed pipes of mobile/manufactured homes. The cable is provided with an attachment plug and are intended to be connected to a receptacle outlet on the underside of the mobile/manufactured home.

Equipment is intended to be installed in accordance with the requirements of Articles 427 and 550 of NFPA 70, "National Electrical Code."

Pipe heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, this heating cable is intended for use only on metallic pipes.

UNEVALUATED FACTORS

The physiological effects on persons consuming liquid effected by use of this equipment has not been investigated.

RELATED PRODUCTS

Heating cable for use with fire suppression sprinkler or standpipe systems is covered under Heating Cable Systems for Use on Fire Protection System Piping (VFZZ).

Heating cable for use as fixed outdoor electric de-icing and snow melting systems is covered under De-Icing and Snow Melting Equipment (KOBQ).

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Heating cable for use to reduce the likelihood of water freezing in residential pipes is covered under Residential Pipe Heating Cables (KQYI).

ADDITIONAL INFORMATION

For additional information, see Pipe Heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1462, "Outline of Investigation for Mobile/Manufactured Home Pipe Heating Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mobile/Manufactured Home Pipe Heating Cable."

Pipe Heating Cable, Industrial and Commercial (KQXR)

USE AND INSTALLATION

This category covers electric heating cable intended to be installed on or in pipes in accordance with Article 427 of NFPA 70, "National Electrical Code."

The heating cable is intended to be connected to the supply system by permanent wiring methods.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, the heating cable is intended for use only on metallic pipes.

RELATED PRODUCTS

Heating cable for use with fire suppression sprinkler or standpipe systems is covered under Heating Cable Systems for Use on Fire Protection System Piping (VFZZ) in the Fire Protection Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Pipe Heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pipe Heating Cable."

Residential Pipe Heating Cable (KQYI)

This Listing covers electric heating cables intended to reduce the likelihood of water freezing in residential pipes. They are provided with a flexible cord and attachment plug and are intended specifically for residential pipe heating uses such as sprinkler systems and in crawl spaces, basements, well houses and the like.

These cables are intended for use in accessible locations only.

These cables are intended for use on metal and rigid plastic water-filled pipes. Also see information under "Pipe Heating Cables" (KQUF).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Pipe Heating Cable."

HEATERS, RADIANT HEATING EQUIPMENT (KQYZ)

USE AND INSTALLATION

This category covers radiant heating equipment such as space heating cable, heating panels and heating panel sets intended to be installed as fixed equipment for space heating for use in accordance with Article 424 of ANSI/NFPA 70, "National Electrical Code" (NEC). These products form an integral part of the building construction after on-site assembly, installation and connection.

To supplement the general requirements given in the applicable Article of the NEC, the manufacturer is required to provide with the units specific installation instructions concerning any limitations of the installation and/or use of the equipment. Flexible ceiling heating panels and heating panel sets are intended to be installed without air gaps in direct contact with thermal insulation. Failure to comply with all installation instructions may result in a risk of fire or electric shock.

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Radiant heating panels and heating panel sets are marked "Radiant Ceiling Heating Panel," "Radiant Floor Heating Panel" or "Radiant Concrete Heating Panel," as appropriate. Units intended for concrete installation are further marked "Concrete Installation Only."

The instructions for panel or cable units intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used. Cable units are provided with a tag attached to the nonheating leads which supplement the installation instructions.

The instructions for heating panels and heating panel sets intended for connection of single conductor supply cable specify the type of cable to be used and state that "Type NM and NMC nonmetallic-sheathed cable is not suitable for installing this product."

Cable units furnished with nonheating leads of single conductor Type UF cable, or pre-loomed Type TW wire, have been investigated to determine that the use of additional flexible nonmetallic tubing is not required over the nonheating leads when the cable units are installed. The single conductor Type UF cable may be identified by the type designation printed at frequent intervals on the cable.

See also listings for room thermostats, controls and other wiring devices in the Electrical Construction Equipment Directory.

Connectors to be assembled to wire in the field using a special tool are to be assembled using the tool specified by the manufacturer.

Stapling guns, if used in the installation of heating cable units require specially designed heads to prevent damage to the conductor insulation. Only those guns recommended by the cable unit manufacturer should be used for this purpose.

RELATED PRODUCTS

For cable intended for pipe heating, see Mobile Home Pipe Heating Cable (KQVU) and Pipe Heating Cable (KQUF). For cable intended for snow melting and de-icing, see De-Icing and Snow-Melting Equipment (KOBQ).

For radiant heating panels intended to be installed in a dropped or suspended ceiling, see Air Heaters, Room, Fixed and Location Dedicated (KKWS).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 499, "Electric Heating Appliances," UL 1693, "Electric Radiant Heating Panels and Heating Panel Sets" and UL 1673, "Electric Space Heating Cables."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Radiant Heating Cable," "Radiant Heating Panel Unit," "Radiant Heating Embedded Unit" or other appropriate product name as shown in the individual Listings. The words "Radiant Heating" must appear in addition to the individual product identity.

HEATERS, RANGES, HOUSEHOLD ELECTRIC (KRMX)

Listings in this category include household type all electric cooking equipment (consisting of oven and surface units), combination electric and solid fuel cooking equipment (consisting of electric ovens and surface units, together with a solid fuel combustion section), wall-mounted and counter mounted cooking equipment.

Cooking equipment-refrigerator combinations are Listed under Kitchen Units, Refrigerated (SJPT).

Cooking equipment is investigated and tested to determine that it can be properly installed in accordance with the installation instructions provided by the manufacturer. Some of the more common arrangements are described in the following paragraphs.

General — Microwave cooking appliances and hood fans with or without a shelf or compartment to accommodate a microwave oven, that have been investigated and found suitable for installation above a counter level range or a counter mounted cooking unit are identified for such installation. The minimum acceptable vertical clearance between the counter level range or counter mounted cooking unit and this appliance is specified in the appliance installation instructions, product markings or both. See Guide Information for Microwave Cooking Appliances (KQSQ) and Electric Fans (GPVV).

All Electric Arrangements

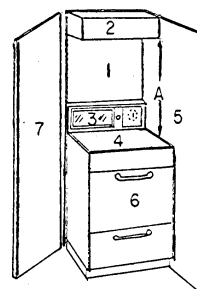
COUNTER-LEVEL RANGES — (See Fig. 1)

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The range with or without a warming tray located on the top of the back guard may be installed close against vertical walls at the back and at both sides and a top cabinet may be installed not less than "A" inches above the top of the cooking platform. See Dimension "A" in Fig. 1.

FIG. 1



1. Building back wall
2. Top building cabinet
3. Control panel
4. Cooking surface

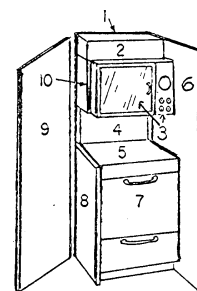
5. Building side wall
6. Oven
7. Building side wall

A = 30 in. minimum clearance between the top of the cooking platform and the bottom of an unprotected wood or metal cabinet; or A = 24 in. (not applicable when an electrically heated warming tray is provided on the back guard) when the bottom of the wood or metal cabinet is protected by not less than 1/4 in. flame retardant millboard covered with not less than No. 28 MSG sheet steel, 0.015 in. stainless steel, 0.024 in. aluminum or 0.020 in. copper.

EYE-LEVEL RANGES — (See Fig. 2)

The range (with either one or two ovens) may be installed close against a vertical wall at the back and a top cabinet may be installed above the upper oven. If the range does not have a top control panel (this design not shown in illustration) an upper end cabinet of the same depth as the cabinet above the oven and a base cabinet both 6 in. minimum width shall be installed at the end of the range opposite the hinged end of the door. If a top control panel is provided at that end, the upper end cabinet and base cabinet may be omitted and the range may be installed close against a vertical wall at that end. The end of the range on which the hinges are located may be installed close against a vertical wall; except that when the wall prevents opening of the door to a position which will permit the removal of an oven rack, an upper end cabinet of the depth mentioned above and a base cabinet (both of sufficient width) may be installed such that the required opening of the door is achieved. If a lower oven or storage area is not provided to permit floor mounting, the range may be installed on a bottom cabinet or over any specific appliance with which the range is intended to be used.

FIG. 2



1. Building back wall
2. Top building cabinet
3. Oven and top control panel
4. Range back guard
5. Cooking surface

6. Building side wall
7. Oven and bottom building cabinet
8. Base building cabinet
9. Building side wall
10. Upper end building cabinet

All Electric Wall-Mounted Ovens and Counter-Mounted Cooking Units

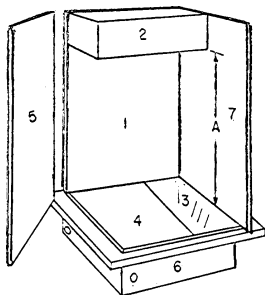
These include wall-mounted and counter mounted cooking equipment or combinations thereof intended to be permanently installed on or in the building structure. Spacings to combustible materials are the minimum allowed by the construction of the device. Unless specifically indicated by marking on the appliances, the individual oven units or counter mounted cooking units are intended for single unit installation only and are not intended for stacking or placing in pairs side by side or back to back. When double unit installation is intended the installation instructions give the minimum centerline spacings unless the units are suitable for the smallest clearance between units permitted by the construction. For cook-

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ing units a top cabinet may be installed "A" inches above the top of the cooking platform. See Dimension "A" in Fig. 3, and note following Fig. 1.

FIG. 3



1. Building back wall
2. Top building cabinet
3. Control panel
4. Cooking surface
5. Building side wall

6. Bottom building cabinet
7. Building side wall

COMBINATION RANGES

As permitted by the installation marking, the range may be installed close against a vertical wall or with no more than a 6 in. air space to a vertical wall at the end where electrical units are located. See the table below for the spacings at the flue or vent and at the end of the range where solid fuel is burned.

Type or Fuel & Range Construction	Spacing to Wall From Nonelectrical End of Range in In.	Spacing From Flue or Vent in In.
Solid fuel, fire pot without fire-clay lining	36	18
Solid fuel, fire pot with fire-clay lining	24	18

All electric ranges, wall-mounted and counter mounted cooking equipment and combination ranges, intended for nominal 125/250 V or less (including those rated 120/208), three-wire, operation are provided with a bonding connection between the frame of the appliance and the neutral to provide grounding in accordance with the provisions of the National Electrical Code. Unless the appliance is marked "Warning-Frame Grounded To Neutral Of Appliance Through A Link. This Range Not For Use In Mobile Homes Or In Areas Where Local Codes Do Not Permit Grounding Through Neutral" instructions are provided for disconnecting the bond and making a direct connection of the metallic parts or the unit to ground.

The flexible metallic conduit and high temperature insulated leads provided with some ranges are tested and recognized as a component part of the equipment. Unless a conduit fitting or outlet box is installed at the factory, tape or other means is provided at the end of the conduit to protect the conductors during shipment. This protection is not intended to take the place of a conduit bushing or fitting which is required by the National Electrical Code.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

The basic standards used to investigate products in this category are UL858, "Household Electric Ranges" and UL923, "Microwave Cooking Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Range", "Electric Range", or other appropriate product name.

WATER HEATERS (KSAV)

This listing covers water heaters with sub-categories of Commercial Storage Tank and Booster, Heat Pump, Heat Pump for Specific Use, Household Storage Tank, Immersion, Miscellaneous and Space Heating. These water heaters have been investigated to determine their suitability for uses as indicated for each sub-category.

Commercial Storage Tank and Booster Water Heaters (KSBZ)

This listing covers water heaters intended to supply hot water for commercial or industrial use, and to be installed in ordinary locations in accordance with the National Electric Code.

These water heaters are equipped with a temperature-regulating device that limits the water temperature to a maximum of 90 C (194 F). These

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heaters are also equipped with a manually reset temperature limit control that restricts the water temperature to a maximum of 99 C (210 F) should a regulating control fail.

A combination temperature-pressure relief valve is supplied or factory installed on these heaters. When supplied separately adequate instructions for mounting the valve are provided with the heater.

Water heaters listed in this category and which have also been found suitable for marine use, are also listed under the category applicable to marine water heaters. For these, see "Water Heater, Marine" (LXWV) in the Marine Products Directory.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL1453, "Electric Booster and Commercial Storage Tank Water Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Commercial Storage Tank Water Heater", "Booster Water Heater", or other appropriate product name.

Heat Pumps (KSCW)

This category covers products intended to heat water utilizing the heat of rejection from a mechanical refrigeration system and optional accessories for these products. These products are designed to restrict the outlet water temperature to a maximum of 85 C (185 F) under normal operating conditions and to a maximum of 99 C (210 F) under abnormal conditions.

These units may include an integral storage tank or may be designed for connection to a separate tank and may also include electric resistance heaters to heat the water. For those units which do include an integral tank, see Household, Storage Tank Water Heaters (KSDT) for additional information.

These units may be factory assembled in more than one section. These sections are designed for field interconnection in accordance with the manufacturer's installation instructions. In such cases, each section is marked to designate the other section(s) which must be used with it.

In permanently wired units employing two or more motors or a motor (s) and other loads operating from a single supply circuit, the motor running overcurrent protective devices (including thermal protectors for motors) and other factory installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short circuit and ground fault protection requirements of Sec. 430-53 (c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated.

Where the marking specifies fuses, the equipment is intended to be protected by fuses only.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name, as appropriate: "Heat Pump Water Heater," "Section of Heat Pump Water Heater" or "Accessory for Heat Pump Water Heater."

Heat Pumps for Special Use (KSCZ)

This category covers products intended to heat water utilizing the heat of rejection from a mechanical refrigeration system. They are similar to "Heat Pump (Water Heaters)" (KSCW) described in this directory except they are limited to installation with specific makes and models of storage tank water heaters as marked on the heat pump product. All other conditions for their use and installation are the same as described for "Heat Pump (Water Heaters)".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify product which have been produced under its Classification and Follow-Up Service.

**CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
HEAT PUMP WATER HEATER
FOR INSTALLATION ONLY WITH
THE SPECIFIC STORAGE TANK WATER
HEATERS MARKED ON THE PRODUCT**

Space Heating (KSDR)

This listing covers water heaters intended for the heating of water and storage of hot water for space heating purposes, to be installed in ordi-

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nary locations in accordance with the National Electrical Code. These heaters are for use in jurisdictions which permit the use of hot water space heating systems that do not employ tanks constructed and marked in accordance with the ASME Boiler and Pressure Vessel Code. Authorities having jurisdiction should be consulted before installation.

Heaters in this category are equipped with temperature-regulating devices that allow a water temperature not higher than 90C (194F) and also with temperature limiting devices that limit the water temperature to a max of 99C (210F).

Pressurized electric water heaters intended for space heating applications that are constructed and marked in accordance with the appropriate ASME Boiler and Pressure Vessel Code are listed under the category Boilers, Electric (BDJS).

The Listing Mark of Underwriters Laboratories Inc., on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Services. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc., together with the word "LISTED", a control number and the product name "Space Heating Water Heater" or other appropriate product name.

Household, Storage Tank (KSDT)

This listing covers storage tank water heaters rated 12 kw or less and having a tank capacity of more than one gal and not more than 120 gals.

They are intended for household use in ordinary locations and permanent connection to the supply source in accordance with the National Electrical Code.

Household storage tank water heaters are equipped with a temperature-regulating device intended to restrict the water temperature to a maximum of 85 deg C (185 deg F). This device has been preset at the factory to a setting of 60 deg C (140 deg F). These Heaters are also equipped with a manually reset temperature limit control that restricts the water temperature to a maximum of 99 deg C (210 deg F) should a regulating control fail.

Safety devices, such as temperature-pressure relief mechanisms, are not required to be furnished as part of the Listed water heater, but markings and instructions accompany each water heater indicating that a suitable safety device which complies with the local plumbing codes should be connected to the heater at the time it is installed.

Water heaters listed in this category and which have also been found suitable for marine use, are also listed under the category applicable to marine water heaters. For these, see "Water Heater, Marine" (LXWV) in the Marine Products Directory.

Water heaters which have been found to be in accordance with Part 280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency are provided with the marking: Design evaluated by UL in accordance with Part 280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency.

Solar-electric water heaters listed in this category are also listed under the category applicable to solar water heaters. For these, see Water Heaters, Solar (UZWZ).

For additional information, see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL 174, "Household Electric Storage Tank Water Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Household Storage Tank Water Heater" or other appropriate product name.

Immersion Heaters (KSFY)

This listing covers immersion heaters, both cord connected and for permanent connection.

Some immersion heaters intended for permanent connection incorporate thermostats and auxiliary switches which respond to the temperatures created by the immersion heaters. The acceptability of thermostats or auxiliary switch construction; as temperature regulating and/or safety controls when incorporated in the ultimate equipment assembly for which they are intended, must be determined in accordance with the requirements applicable to that equipment.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and "Immersion Heater" or other appropriate product name.

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Miscellaneous Water Heaters (KSGR)

This listing covers instantaneous heaters, strap-on type heaters, heaters for sink or water cooler mounting, and other water heaters not covered under Household Storage Tank Water Heaters, Commercial Storage Tank and Booster Water Heaters, or Immersion Heaters.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Instantaneous Water Heater", "Water Heater", or other appropriate product name.

HEATERS, WATERBEDS (KSHU)

This listing covers cord connected electric heaters, usually in the form of mats, for use under the mattress of waterbeds. Heaters employing external, user-adjustable temperature control units are covered as a unit, for installation in accordance with the manufacturer's instructions.

The basic standard used to investigate products in this category is UL1445, "Electric Water Bed Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Waterbed Heater".

HEATERS, MISCELLANEOUS (KSOT)

GENERAL

This category covers heating appliances rated 600 V or less for use in accordance with NFPA 70, "National Electrical Code" (NEC). This includes heating appliances intended for household and industrial applications, as well as products that generate steam for other than space heating purposes, and have an electrical power rating of 15 kW or less per steam generating vessel. A heating appliance is defined as an electrically energized product that directly or indirectly generates heat to perform its intended function.

Heating devices may present certain inherent hazards. The temperatures necessary for their normal use can be high enough to cause fire if they are left in contact with combustible materials.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, necessary special instructions are marked on the equipment.

UNEVALUATED FACTORS

The physiological effects of the liquids which may be employed in conjunction with the heating devices have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 499, "Electric Heating Appliances".

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Hand Dryer," "Pet Dryer," "Embosser," "Stock Tank Heater," "Charcoal Igniter," or the name of the specific type of product as shown in the individual Listings.

HEATERS, MISCELLANEOUS, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (KSSG)

The heaters covered in this category are for installation on the specific models of UL Listed heating equipment that are shipped from the factory without heaters installed. These heaters have been investigated by UL in specific models identified in markings or instructions to determine that, when used in accordance with the manufacturer's instructions, the complete product complies with applicable requirements.

The basic standard used to investigate products in this category is UL 499, "Electric Heating Appliances".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

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The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification Marking includes (1) the UL symbol; (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory; (3) the product identity; (4) "FOR USE WITH (identification of specified UL Listed product)"; and (5) a control number.

HEATING AND COOLING EQUIPMENT (LZFE)

This category covers various types of heating and cooling equipment as follows, typically used for space conditioning:

Absorption Air Conditioning Equipment
Air Conditioning Systems Equipment
Central Cooling Air Conditioners
Condensing/Compressor Units
Control Panels (Remote) for Electric Space Heating Equipment
Electric Central Heating Furnaces
Environmental Air Terminal Units
Fan-coil Units
Fan Units
Heat Pump Water Heaters
Heat Pumps
Heating and Cooling Units
Liquid Chillers
Mechanical Draft Water Cooling Towers
Refrigerant Condensers (Forced Air Cooled)
Room Air Terminal Units
Room Fan Heater Units
Special Purpose Air Conditioners
Ventilating Units
Miscellaneous Heating and Cooling Equipment
Heating and Cooling Equipment Accessories

Individual sections following the "General Information" section are identified for each type of equipment. Not all statements in the "General Information" are applicable to all types of equipment covered by this category. Only the statements that are identified are applicable. Refer to the individual sections for the general information that is applicable.

Wiring Termination Provisions

For permanently connected equipment, the wiring termination provisions are based on tests during product evaluation, and Table 310-16 of the National Electrical Code, NFPA 70 (NEC) as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities in which case the equipment is marked for 90°C conductors.
3. Insulation temperature rating of 75°C or 90°C and wire size as marked on the unit.

Also see "Appliance and Utilization Equipment" under Electrical Equipment for Use in Ordinary Locations (AALZ) and "Electrical Installations" under Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

General Information

Product Types

1. The following defines types of systems covered in the individual sections below:
- A. **Self-contained** — Refrigeration system in one section, factory assembled, with refrigerant charge and tested for leaks.
- B. **Compressor Unit** — Includes one or more compressors with associated controls and wiring and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit; and to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term is applicable both to refrigeration equipment of any size and also to air conditioning equipment. The term "air conditioning systems equipment, compressor unit" is used for air conditioning equipment rated over 135,000 BTU per hr.)
- C. **Compressor Condenser Unit** — Includes one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote evaporator, unit cooler, or fan-coil unit. (The term is applicable to air conditioning systems equipment only.)
- D. **Compressor-evaporator (Cooler) Unit** — Includes one or more compressors and evaporators (coolers) with interconnecting refrigerant tubing or piping and with associated controls and wiring. The unit is factory assembled and tested for leaks. The refrigerant type is marked on the unit and the operating refrigerant charge may or may not be provided as indicated on the unit nameplate.
- These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term "compressor-evaporator" is applicable to air conditioning systems equipment and special purpose

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air conditioners, and the term "compressor-cooler" is applicable to liquid chillers.)

- E. **Compressor Evaporator/Condenser** — Refrigeration system in two sections, one including the compressor and the evaporator and the other, the condenser. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the compressor evaporator unit nameplate. Each section is tested for leaks. (The term is applicable to central cooling air conditioners and special purpose air conditioners.)
- F. **Condensing Unit/Evaporator (Outdoor/Indoor Unit)** — Refrigeration or air conditioning system in two sections, the condensing unit (or outdoor) section including the compressor and condenser and the other section the evaporator (indoor section). The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the condensing unit nameplate.
- Each section is tested for leaks. (The term "condensing unit/evaporator" is applicable to central cooling air conditioners and special purpose air conditioners, and the term "outdoor/indoor unit" is applicable to heat pumps.)
- G. **Heating, Cooling and Ventilating Equipment** — Intended for use as part of a complete system and when installed may be associated with other equipment and components which are separately Listed. Unless indicated in individual Listing Information Pages or Cards (#) for the other equipment, this equipment has not been investigated for operation when combined with other Listed equipment in a complete system assembled in the field.
- H. **Condensing Unit** — Includes one or more compressors and air- or water-cooled condensers with interconnecting refrigerant piping and with associated controls and wiring and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler, or fan-coil unit. (Same as "C" above, except the term is applicable to refrigeration equipment or to air conditioning equipment of any size.)
2. Heating and cooling equipment of the unitary type consists of one or more factory-built sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the heating and/or cooling equipment. Equipment provided in two or more sections is either marked to identify the appropriate sections for proper installation, or the designations of the sections comprising the assembly are shown in the Listing Information. Where so designated, a separately Listed electric central heating furnace, fan-coil unit, or fan unit may serve as a portion of the assembly.
3. Listed equipment is rated 600 V or less. Centrifugal type units as identified in the Listing Information Pages or Cards (#) are rated 7200 V or less.

Installation Codes

4. This equipment is intended to be installed in accordance with the requirements of the National Electrical Code, NFPA 70 (NEC).
5. Equipment to be connected to an air duct system is intended for installation in accordance with NFPA 90A, "National Fire Protection Association Standard for Installation of Air Conditioning and Ventilation Systems" or NFPA 90B, "Warm Air Heating and Air Conditioning Systems."
6. Equipment with a gas-, oil-, or gas-oil-fired burner(s) is intended to be installed in accordance with appropriate National Fire Protection Association standards including NFPA 31, "Installation of Oil-burning Equipment," NFPA 54, "National Fuel Gas Code" or NFPA 58, "Liquefied Petroleum."
7. For equipment intended to be installed in mobile homes, reference should be made to The Code of Federal Regulations, Chapter 24, Part 3280.
8. For equipment intended to be installed in recreational vehicles, reference should be made to NFPA 501C, "National Fire Protection Association Standard For Recreational Vehicles."
9. Equipment is marked with the refrigerant type used and some units may employ alternative refrigerants that are not currently listed in the ASHRAE 15 Code, but are included in ASHRAE 34-1994. The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in the ASHRAE 15 Code, UL's Listing Reports, available from the manufacturer, identify installation requirements applicable to the alternative refrigerants in the same manner as shown in the ASHRAE 15 Code for currently used refrigerants.
- The refrigerants are classified A1 or A1/A1 by ASHRAE 15 and have been determined to be nonflammable or practically nonflammable in accordance with the requirements in UL 2182, "Refrigerants."

Wiring Diagrams

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10. The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

Units Used with Duct Heaters

11. Unless otherwise indicated on the Listing Information Pages or Cards (#), Listed duct heaters that may be installed in conjunction with the equipment covered in the Listings are intended to be installed at least 4 ft downstream from the equipment.

Field-installed Accessories

12. Heating and cooling equipment that has been investigated and found suitable for use with Listed field-installed accessories, such as electric resistance heaters (including duct heaters), are specifically indicated on the Listing Information Pages or Cards (#). See Accessories, Air Conditioning Equipment (ABFY) and Duct Heaters, Electric (KOHZ).
13. Units that have been investigated and found suitable for use with field-installed steam, hot water, or refrigerant coils or with electric resistance heaters (including Listed accessories or duct heaters as noted in paragraph 11 above) are marked to so indicate.

Electric Heat Considerations

14. Units that incorporate factory- or field-installed electric resistance heaters are identified on the Listing Information Pages or Cards (#).
- Field-installed electric resistance heaters that have been investigated by UL for the manufacturer and found suitable for use with the Listed equipment at the time of Listing, are identified on the Heating and Cooling Equipment Nameplate by manufacturer's name and part number, or are covered under Electric Heater Assemblies Classified for Use on Specified Equipment (LZPU).
15. Where a through-air clearance to combustible materials is required, this clearance is marked on the heating and/or cooling equipment and is designated on the Listing Information Pages or Cards (#). The clearances are the minimum required to avoid overheating; additional clearances may be required for accessibility.
- When zero clearance is specified, temperatures are measured directly on the unit cabinet with uninsulated sheet metal ducts and plenum attached. When clearances other than zero are specified, temperatures are measured on a wood test enclosure spaced at the specified clearances from the unit cabinet, ducts and plenum.
16. In heating and cooling equipment employing electric resistance heaters rated more than 48 A, the loads are subdivided so that each load does not exceed 48 A and is protected by overcurrent devices at not more than 60 A.
- The overcurrent devices are either included as an integral part of the heating and cooling equipment or are furnished as a separate assembly. If the overcurrent devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies specifically recognized for use with electric space heaters provided as part of this equipment, see "Control Panels for Specific Electric Space Heating Equipment" below. Other Listed separate assemblies, as referenced on a marking on the heating and cooling equipment, may also be used.

Unit Installation

17. Unless otherwise specified in the marking on the equipment, the unit may be installed on combustible flooring.
18. Attic type units are so indicated on the Listing Information Pages or Cards (#). Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided on the unit.
19. Units/Sections that are suitable for outdoor installation are so marked and are identified on the Listing Information Pages or Cards (#) either by the term "outdoor section" or by an appropriate footnote. Units/Sections not marked as suitable for outdoor installation are for indoor use only.

(#) Additional information as noted above is available on Listing Information Pages or Cards published by UL, and available from the manufacturer.

Motor Group Installations

20. In permanently connected units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor components and wiring are investigated on the basis of compliance with the motor branch circuit, short-circuit and ground fault protection requirements of Section 430-53(c) as referenced in Section 440-22 of the NEC. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating that does not exceed the value marked in the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "HACR Type" circuit breakers, the circuit is to be protected only by the type of protective devices specified.

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The basic standard used to investigate products in this category is UL 1995, "Heating and Cooling Equipment." Other standards may also be used where specifically indicated in the individual sections (see "Room Air Terminal Units" below).

For Listings of various types of heating and cooling equipment that are investigated in accordance with other standards, see the following table. Categories ACVS and SLSV will be revised to cover only equipment investigated under Standards UL 484 and UL 207, respectively. All other indicated categories will be obsolete.

Absorption Air Conditioning Equipment	UL 465	ABCT
Air Conditioners, Central Cooling	UL 465	ACAV
Air Conditioners, Special Purpose	UL 465 or UL 484	ACVS
Air Conditioning Liquid Chillers	UL 465	ADCR
Air Conditioning Systems Equipment	UL 465 or UL 303	ADPZ
Heat Pumps	UL 559	AGUX
Control Panels, Remote, for Electric	UL 1096	KMLW
Space Heating Equipment		
Furnaces, Electric Central Heating	UL 1096	KOVX
Heat Pumps (Water Heaters)	UL 559	KSCW
Heating and Cooling Units	UL 465	LYYR(+)
Fan Units	UL 883	LZSY
Fan-coil Units	UL 883	LZQV
Plenum Air Terminal Units	UL 883	LZVF
Room Air Terminal Units	UL 883	LZVR
Room Fan-heater Units	UL 883	LZXU
Ventilating Units	UL 883	LZYW
Water-cooling Towers, Mechanical Draft	UL 883	SFPZ
Condensing and Compressor Units	UL 303	SGYU
Condensers, Refrigerant	UL 303 or UL 207	SLSV

**(+) Heating, Cooling, Ventilating and Cooking Equipment Directory
Listing and/or Classification Mark**

The Listing and/or Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and/or Classification and Follow-Up Service.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as shown in the following individual sections or as shown in the individual Listings.

The Classification Mark for these products is described below under the section headings for which the Classification Mark is appropriate.

ABSORPTION AIR CONDITIONING EQUIPMENT

"General Information" paragraphs 1A, 2, 3, 4, 5, 6, 9, 19 and 20 are applicable to this equipment.

This equipment is of the unitary type employing an absorption type refrigeration system, and intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is intended primarily, but not exclusively, for air conditioning application.

The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat, and/or gas-, oil-, or gas-oil-fired burners. For Listings of absorption air conditioning equipment that are provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating, see Absorption Air Condition Equipment (KTFV).

AIR CONDITIONING SYSTEMS EQUIPMENT, SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COOLING PORTION OF SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-EVAPORATOR UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-CONDENSER UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR UNITS

"General Information" paragraphs 1A, 1B, 1C, 1D, 3, 4, 5, 6, 9, 10, 11, 12, 13, 15, 16, 17, 19 and 20, are applicable to this equipment.

Equipment covered in this section has a rated cooling capacity exceeding 135,000 BTU per hr and is intended for commercial or industrial central cooling applications. For Listings of equipment rated 135,000 BTU per hr or less, see sections headed "Air Conditioners, Central Cooling" or "Condensing Units" in this category. For additional Listings of self-contained units incorporating gas-, oil-, or gas-oil-fired burners, see "Heating and Cooling Units" below.

Self-contained units and compressor-evaporator units may include heating means, including: electric resistance heaters; gas-, oil-, or gas-oil-fired burners; or hot water or steam coils.

The basic standard used to investigate the refrigeration portion of the products in this category is UL 1995, "Heating and Cooling Equipment." The standard used to investigate the gas heating portion of the products

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in this category is UL 795, "Commercial-Industrial Gas Heating Equipment" or other standards as identified in the Classification Mark appearing on the product.

A gas-fired heating portion included in this product category is for use only in the same manufacturer's specified air conditioning systems equipment as marked on the heating portion and as indicated in the individual Classification.

The Classification Mark is optional on a Listed Self-contained Unit or is included on a Classified Gas-fired Heating Section of a Listed Self-contained Unit.

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information:

**GAS HEATING PORTION
IN ACCORDANCE WITH
ANSI Z21.1 - ++**

+ 47 or 64 as appropriate

++ Issue date of latest standard or addendum

CENTRAL COOLING AIR CONDITIONERS

SECTIONS OF CENTRAL COOLING AIR CONDITIONERS

ACCESSORIES FOR CENTRAL COOLING AIR CONDITIONERS

"General Information" paragraphs 1A, 1E, 1F, 2, 3, 4, 5, 7, and 9 through 20 inclusive are applicable to this equipment.

This equipment is of the unitary type for commercial or domestic central cooling applications.

For Listings of central air conditioning equipment rated more than 135,000 BTU per hr, also see Air Conditioning Systems Equipment (ADPZ).

Unitary air conditioners consist of one or more factory-made sections, as described in the General Information. Unless so indicated on the Listing Information Pages or Cards published by UL, and available from the manufacturer, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section.

CONDENSING UNITS

COMPRESSOR UNITS

ACCESSORIES FOR CONDENSING UNITS

ACCESSORIES FOR COMPRESSOR UNITS

ACCESSORIES FOR CONDENSING OR COMPRESSOR UNITS

"General Information" paragraphs 1B, 1H, 3, 4, 9, 13, 19 and 20 are applicable to this equipment.

This equipment is intended to be installed in air conditioning and refrigeration systems.

Units in this section intended for refrigeration service may be of any BTU per hr capacity. For Listings of units intended primarily for air conditioning applications, see sections "Air Conditioning Systems Equipment" (rated more than 135,000 BTU per hr) or "Central Cooling Air Conditioners."

Some condensing units or compressor units in this section are intended for field connection to multiple refrigeration systems and include multiple condensing units, compressor units, or compressors, with single or multiple condensers, with associated piping, controls, and wiring, mounted on a common frame or in a common housing.

The acceptability of operation of these units, when associated with other components of a complete system, has not been investigated.

These units are to be used only in systems with the specified refrigerant and operating at pressures not in excess of those indicated by the marked test pressures.

**GENERAL PURPOSE CONTROL PANELS FOR ELECTRIC SPACE
HEATING EQUIPMENT**

**CONTROL PANELS FOR SPECIFIC ELECTRIC SPACE HEATING
EQUIPMENT**

"General Information" paragraphs 3 and 4 are applicable to this equipment.

For Control Panels for Specific Electric Space Heating Equipment, see equipment nameplate and installation instructions.

This section covers electrical panels incorporating control and/or overcurrent devices intended specifically for remote use with electric space heating equipment, including air conditioning equipment with electric resistance space heaters.

Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Section 424-22(c) of the NEC.

Unless otherwise specified in the manufacturer's installation instructions, these panels are intended to be mounted remote from the space heating equipment, in a location where they will not be affected by heat or condensation from operation of the equipment.

The proper installation of these panels requires careful consideration of the individual manufacturer's installation instructions and wiring diagrams.

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General purpose panels are not limited to use with specific makes and models of space heating equipment. These panels are provided with installation instructions and wiring diagrams showing supply connections, connections to the space heating equipment, and control circuit connections to be completed at the time of installation.

For general purpose panels containing only overcurrent devices or only magnetically operated switching devices, see Listings under Panelboards (QEUY) or Industrial Control Equipment (NIMX), respectively.

Panels to be used only with specific Listed equipment are so identified and the equipment is marked to require the particular panel. The installation instructions and wiring diagrams for these panels may be provided with the panel or may be provided only with the Listed space heating equipment.

ELECTRIC CENTRAL HEATING FURNACES

SECTIONS OF ELECTRIC CENTRAL HEATING FURNACES

"General Information" paragraphs 2, 4, 5, 7, 8, 9, 15, 16 and 20 are applicable to this equipment.

This section covers electrically operated central heating furnaces intended for use in space heating application in homes and other types of buildings, including mobile homes and recreational vehicles, as indicated in the manufacturer's installation instructions.

Warm-air furnaces have provision for connection to a duct system, except furnaces intended only for installation in a single-story residence need not have provision for connection of a return air duct.

Each electric central heating furnace is provided with an individual marking and instructions. If a noncombustible floor material is required, the necessary clearances to combustible constructions and proper installation in an alcove or closet are specified in the marking and/or instructions.

This information also appears on Listing Information Pages or Cards (#).

Furnaces consist of one or more factory-built sections. Equipment provided in more than one section is designed for field interconnection of matched sections to make the complete assembly. The individual sections that comprise the assembly are identified on the Listing Information Pages or Cards (#) and by a cross-reference marking on at least one of the sections. Similar sectionalized units are also covered under Fan Units (LZSY).

Furnaces that have been investigated and found suitable for use with a field-installed refrigerant coil are so identified on the Listing Information Pages or Cards (#) and the refrigerant coil(s) for such use are identified by a marking on the furnace. Tests of furnaces with these field-installed coils intended for cooling, or with integral factory-installed coils intended for cooling, have indicated no adverse effects on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to a condensing unit of a central cooling air conditioner has been evaluated only for those specific combinations identified in the separate Listing Information Pages or Cards (#) of "Air Conditioners, Central Cooling" above, or for those specific condensing units identified by a marking on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to an outdoor section of a heat pump has been evaluated only for those specific combinations identified in the separate Listing Information Pages or Cards (#) of "Heat Pumps" above. The effect of refrigerant heating on the furnace has not been evaluated for other combinations.

(#) Additional information as noted above is available on Listing Information Pages or Cards published by UL, and available from the manufacturer.

ENVIRONMENTAL AIR TERMINAL UNITS

"General Information" paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This section covers fixed appliances that include a motor operated fan or blower with or without electric resistance heaters. The appliances are intended to be installed in accordance with the manufacturer's installation instructions in plenums above hung (suspended) ceilings where the inlet air to the appliance is taken from this plenum space in accordance with Section 300-22(c) of the NEC.

The air outlet may be free discharge or be ducted to ceiling diffusers.

FAN-COIL UNITS

SECTIONS OF FAN-COIL UNITS

ACCESSORIES FOR FAN-COIL UNITS

"General Information" paragraphs 1G, 2, 3, 4, 5, and 9 through 20 inclusive are applicable to this equipment.

This section covers appliances that include a motor operated fan or blower together with a cooling coil, a heating coil, or both, and may also include an electric heater. The fan or blower is designed to recirculate air or to draw in outside air, or both. The coil may be designed for refrigerant cooling, for refrigerant heating, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions.

A fan-coil unit is intended to be piped to a remote source of heat, of cooling, or of both. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply lines.

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Equipment intended for use with hot water is marked for a maximum inlet water temperature.

Equipment intended for use with steam is marked for a maximum inlet steam pressure.

A fan-coil unit containing a refrigerant coil that has been additionally investigated as part of a specific split-system cooling air conditioner, special purpose air conditioner, or heat pump, is also identified as part of that system on the Listing Information Pages or Cards published by UL, and available from the manufacturer of "Air Conditioners, Central Cooling," "Air Conditioners, Special Purpose" or "Heat Pumps" above.

A fan-coil unit, as covered by these requirements, may be designed for free delivery of air to the room or may be provided with means for duct connection. Representative types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units.

A room-type unit is designed to circulate air to the conditioned space directly, or by means of duct work having a static-pressure drop not exceeding 0.05 in. of water.

For units that are similar to fan-coil units with electric resistance heaters, but are not provided with a refrigerant, steam or water coil, see Listings of "Room Fan Heater Units" below.

FAN UNITS

"General Information" paragraphs 1G, 3, 4, 5, 9, 10, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This equipment is intended to be connected to a duct system that supplies conditioned air for environmental heating and/or cooling. The units consist of a motor operated fan or blower and may have air control dampers. The units may be thermostatically operated by integral or remote controls. The units do not include factory-installed heat exchangers or other integral heating or cooling means.

Fan units with field-installed heater accessories as detailed in paragraph 12 of the "General Information" are the equivalent of "Electric Central Heating Furnaces" above.

Units intended for use in duct systems with air temperatures exceeding normal room ambient temperature are marked with the maximum inlet air temperature rating.

Other types of fans for duct connection are covered under Fans, Electric (GPVW) and Ventilators, Power (ZACT).

HEAT PUMPS

SECTIONS OF HEAT PUMPS ACCESSORIES FOR HEAT PUMPS

"General Information" paragraphs 1A, 1F, 2, 3, 4, 5, 7, and 9 through 20 inclusive are applicable to this equipment.

Equipment covered in this section is reverse cycle unitary air conditioning systems for comfort heating and cooling (or for comfort heating only), if so indicated on the Listing Information Pages or Cards published by UL, and available from the manufacturer.

HEAT PUMP WATER HEATERS

SECTIONS OF HEAT PUMP WATER HEATERS ACCESSORIES FOR HEAT PUMP WATER HEATERS

"General Information" paragraphs 2, 3, 4, 9, 10 and 20 are applicable to this equipment.

This category covers products intended to heat water utilizing the heat of rejection from a mechanical refrigeration system and optional accessories for these products. These products are designed to restrict the outlet water temperature to a maximum of 85°C (185°F) under normal operation conditions and to a maximum of 99°C (210°F) under abnormal conditions.

These units may include an integral storage tank or may be designed for connection to a separate tank and may also include electric resistance heaters to heat the water. For those units that include an integral tank, see Water Heaters, Household, Storage Tank (KSDT) for additional information.

HEATING AND COOLING UNITS

COOLING PORTIONS OF HEATING AND COOLING UNITS

"General Information" paragraphs 1A, 3, 4, 5, 6, 9, 10, 15, 19 and 20 are applicable to this equipment.

The equipment covered in this section is a self-contained assembly manufactured for installation as a package. It includes all the necessary components needed for both heating and cooling. Heating is by gas-, oil-, or gas-oil-fired burner(s). Cooling is by mechanical refrigeration with any rated cooling capacity.

The information pertaining to safe placement is indicated in the individual Listings, on the Listing Information Pages or Cards published by UL, and available from the manufacturer.

The name and amount of refrigerant, test pressure, and electrical rating appear on the unit.

A gas-fired heating portion included in this product category is for use only in the same manufacturer's specified air conditioning systems equipment as marked on the heating portion and as indicated in the individual Classification.

The Classification Mark is optional on a Listed Heating and Cooling Unit or is included on a Classified Gas-fired Heating Section of a Listed Heating and Cooling Unit.

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The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information:

GAS HEATING PORTION IN ACCORDANCE WITH ANSI Z21.+ - ++

+ 47 or 64 as appropriate

++ Issue date of latest standard or addendum

LIQUID CHILLERS, SELF-CONTAINED UNITS LIQUID CHILLERS, COMPRESSOR-COOLER UNITS AIR CONDITIONING LIQUID CHILLERS

SECTIONS OF AIR CONDITIONING LIQUID CHILLERS

"General Information" paragraphs 1A, 1D, 2, 3, 4, 6, 9, 10, 19 and 20 are applicable to this equipment.

Equipment covered in this section is intended for cooling of liquid, such as water or water-antifreeze solutions. The equipment is intended primarily, but not exclusively for, air conditioning application.

For drinking water coolers, commercial processing water coolers, and other liquid chillers that have been investigated only for commercial refrigeration applications other than air conditioning, see Refrigeration Equipment (SCER).

For Listings of absorption air conditioning equipment that utilize hot fluid (such as gas, liquid or steam) as the direct energy source for cooling and heating, see "Absorption Air Conditioning Equipment" above.

For Listings of absorption air conditioning equipment provided with a gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating, see Absorption Air Conditioning Equipment (KTFV).

Air conditioning liquid chillers rated 135,000 BTU per hr or less are of the unitary type. Liquid chillers with a rated cooling capacity exceeding 135,000 BTU per hr may be either self-contained units or compressor-cooler units.

MECHANICAL DRAFT WATER COOLING TOWERS ACCESSORIES FOR MECHANICAL DRAFT WATER COOLING TOWERS

"General Information" paragraphs 1G, 3, 4, 9, 10, 19 and 20 are applicable to this equipment.

This section covers equipment intended for use with water-cooled air conditioning and refrigeration equipment. The water used as a cooling medium may contain antifreeze, and is circulated through the tower via either a finned tube assembly or a system that is open to the atmosphere. The tower includes a motor driven fan or blower and may also include circulation pumps.

Equipment that has been investigated and found suitable for use with Listed accessories, such as pump assemblies, is marked to identify the accessories and is also identified on the Listing Information Pages or Cards published by UL, and available from the manufacturer.

REFRIGERANT CONDENSERS

"General Information" paragraphs 3, 4, 9, 10, 19 and 20 are applicable to this equipment.

This section covers finned tube assemblies incorporating a motor driven fan that are intended to liquefy refrigerant vapor by removal of heat.

For Listings of evaporative or water-cooled devices, see Condensers, Refrigerant (SLSV).

ROOM AIR TERMINAL UNITS

"General Information" paragraphs 1G, 3, 4, 5, 9, 10, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This section covers units designed to be connected to the terminal end of a single duct or duct system supplying air from a remotely located air handling unit for the purpose of providing heating, ventilation and/or cooling.

The unit types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert constructions.

Units incorporating electric heat have an automatic resetting temperature limiting control that is intended to protect against abnormal operating conditions and, in addition, each unit is provided with a replaceable thermal cutoff or a manually resettable temperature limiting control. In addition to UL 1995, the standard used to investigate units incorporating electric heat is UL 1996, "Duct Heaters."

The proper installation of these units requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the volume of air passing through the units and the temperature of the input air.

The manufacturer's application and installation instructions furnished with each unit should be consulted to determine the factors appropriate to the particular installation including required distances between the unit and turns in the duct, changes in duct sizes, air filters, humidifiers, etc. Unless these instructions specify other distances for horizontals or upflow installations, 1) turns in the duct on the inlet side of the unit should be at least 4 ft from the unit; 2) turns in the duct on the outlet side of the unit

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should be at least 2 ft from the unit; and 3) changes in duct size, air filters, humidifiers, etc. should be located at least 4 ft from either side of the unit.

Units incorporating electric heat may have provision for interlocking the air supply and the electric element circuit.

Units may include provision for a coil designed for cooling by refrigerant or chilled water, or heating by steam or hot water, or for combinations of such coils.

ROOM FAN HEATER UNITS

"General Information" paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This section covers fixed appliances that include a motor operated fan or blower and electric resistance heater, or an electrically heated heat exchanger.

The appliances are designed to serve a single room or space. Included are units similar to fan-coil units with electric resistance heaters but which are not provided with a refrigerant, steam or water coil, and units similar to air heaters, but which draw in air from outside the heated space. Listings of air heaters appear under Air Heaters, Room, Fixed and Location-dedicated (KKWS).

A room fan heater may be designed for free delivery of air to the room, or may be provided with a means for connection of a short extension duct. Representative types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated in the "General Information." This information also appears on Listing Information Pages or Cards published by UL, and available from the manufacturer.

SPECIAL PURPOSE AIR CONDITIONERS

SECTIONS OF SPECIAL PURPOSE AIR CONDITIONERS

ACCESSORIES FOR SPECIAL PURPOSE AIR CONDITIONERS

"General Information" paragraphs 1A, 1D, 1E, 1F, 2, 3, 4, 9, 10, 12, 15, 16, 17, 19 and 20 are applicable to this equipment.

Equipment covered in this section is designed for special purposes, such as environmental control of computer rooms.

This equipment consists of one or more factory-made sections, as described in the "General Information." Unless so indicated on the Listing Information Pages or Cards published by UL, and available from the manufacturer, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or be furnished as a separate section.

Computer room air conditioners are intended for installation in accordance with NFPA 75, "Protection of Electronic Computer/Data Processing Equipment." These air conditioners are generally installed on the raised floors of computer rooms and have not been investigated for connection to ducts unless so specified in the individual Listings.

Factory-installed electric heaters and humidifiers have been investigated for this application.

VENTILATING UNITS

SECTIONS OF VENTILATING UNITS

"General Information" paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This section covers units that consist of electric resistance heaters and a motor operated blower. The units may also incorporate means for evaporative cooling. These units are intended to supply heated and/or cooled air to commercial and industrial buildings from which air is being exhausted by other equipment. There is no provision for return-air circulation on these units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated in the "General Information." This information also appears on Listing Information Pages or Cards published by UL, and available from the manufacturer.

MISCELLANEOUS HEATING AND COOLING EQUIPMENT

"General Information" paragraph 4 is applicable to this equipment.

This section covers miscellaneous heating and cooling equipment.

HEATING AND COOLING EQUIPMENT ACCESSORIES

"General Information" paragraph 4, is applicable to this equipment.

The accessories covered in this section are Listed for installation only on Listed Heating and Cooling Equipment as designated in the individual Listings of the equipment and accessories. The accessories are intended primarily for field installation, but may be factory installed.

The equipment on which an accessory covered in this section may be field installed is marked to indicate that it is Listed for use with the specific accessory as designated by model, catalog number, part number, etc. in this section. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed.

Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

The basic standard used to investigate products in this category is UL 1995, "Heating and Cooling Equipment."

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**HEATING, COOLING AND
VENTILATING EQUIPMENT (LZLZ)**

Equipment in this category covers fan-coil units, plenum air terminal units, room air terminal units, room fan heater units, and other equipment intended for comfort heating, cooling and ventilation. Listed equipment is rated 600 volts or less.

Equipment in this category is intended for use as part of a complete system and when installed may be associated with other equipment and components which are separately Listed. The equipment has not been investigated from the standpoint of operation when combined with other equipment in a complete system assembled in the field, unless indicated in individual Listings for the other equipment.

Where a clearance is required to be maintained between the unit or attached duct work and combustible constructions, the clearance is designated in the individual Listing, and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

Unless otherwise specified in the individual listing and marking, the unit may be installed on combustible flooring.

Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided with the unit.

Separately shipped steam, hot water, or refrigerant coils which are suitable for field installation in conjunction with heating, cooling, and ventilating equipment are identified in this section of the Directory (1) by the type or model designation of the coil and (2) by the type or model designation of the heating, cooling, and ventilating equipment with which it is suitable.

In units rated more than 48 amps and employing electric resistance heaters, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the unit or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with electric space heaters provided as part of this equipment, see "Control Panels, Remote, for Electric Space Heating Equipment," in this Directory. Other Listed separate assemblies, as referenced on the equipment marking, may also be used.

In units employing two or more motors or a motor and an electric space heater operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of a compliance with the motor branch circuit short circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multimotor and combination load equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses or "HACR Type" Circuit Breakers, the circuit is intended to be protected only by the type of protective device specified.

A unit to be connected to an air duct system is intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilating Systems, 90A or for Warm Air Heating and Air Conditioning Systems, 90B.

Equipment which is suitable for outdoor installation is so marked. Equipment not marked as suitable for outdoor installation is for indoor use only.

**ACCESSORIES CLASSIFIED FOR USE
WITH SPECIFIED EQUIPMENT (LZNI)**

The units covered in this category are miscellaneous accessories for use with the specific UL Listed Heating and Cooling Equipment (LZFE) as identified by marking on the accessories and in accordance with the installation instructions packaged with the accessories. The company name of the Classified accessory and the name of the Listee of the specified heating and cooling equipment are the same. All parts and materials necessary to accomplish the installation are included with the accessories. The Classification Marking indicates that the accessory has been investigated and found suitable for use in combination with the specified Listed Equipment.

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The basic standard used to investigate products in this category is UL1995, "The Standard for Heating and Cooling Equipment". This Standard is also applicable to the product which the accessory is to be used in combination with.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification marking includes: (1) the UL symbol; (2) the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory); (3) the word "accessory"; (4) FOR USE WITH * _____ UL LISTED MODEL ** _____; (5) a control number.

* Heating and Cooling Equipment Listee's name.

** Heating and Cooling Equipment Listee's model number.

*** Category of Listed Equipment.

For Installation Only On The Specified Heating and Cooling Equipment Marked On The Product.

BLOWER ASSEMBLIES (LZOS)

The blower assemblies covered in this category are intended for field installation on the specific heating and cooling equipment identified by marking on the blower assemblies. The installation shall be in accordance with the installation instructions packaged with the blower assemblies. All parts and materials necessary to accomplish the installation are included with the blower assemblies.

The basic standards used to investigate the products in this category are the standards applicable to the heating and cooling equipment on which the products are to be installed.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

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BLOWER ASSEMBLY**

For Installation Only With The Specific Heating and Cooling Equipment Marked On The Product.

ELECTRIC HEATER ASSEMBLIES CLASSIFIED FOR USE ON SPECIFIED EQUIPMENT (LZPU)

The electric heater assemblies covered in this category are intended for field installation on the specific UL Listed Heating and Cooling Equipment (LZFE) identified by marking on the electric heater assemblies, and in accordance with the installation instructions packaged with the electric heater assemblies. All parts and materials necessary to accomplish the installation are included with the electric heater assemblies. The Classification Marking indicates that the heater assembly has been investigated and found suitable for use in combination with the specified Listed equipment and that this Marking supplements or supersedes any markings related to add on heater assemblies marked on the Listed equipment.

The basic standard used to investigate the products in this category is UL1995, The Standard for Heating and Cooling Equipment. This Standard is also applicable to the product into which the heater assembly is to be installed.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

**ELECTRIC HEATER ASSEMBLY
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE WITH * _____ UL LISTED MODEL ** _____**

* Heating and Cooling Equipment Listee's name.

** Heating and Cooling Equipment Listee's model number.

*** Category of Listed Equipment.

For Installation Only On The Specified Heating and Cooling Equipment Marked On The Product.

FAN-COIL UNITS (LZQV)

This category covers appliances which include a motor operated fan or blower together with a cooling coil, a heating coil, or both and may also include an electric heater. The fan or blower is designed to recirculate air or to draw in outside air, or both. The coil may be designed for refrigerant cooling, for refrigerant heating, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions.

A fan-coil unit is intended to be piped to a remote source of heat, of cooling, or of both. Local authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply lines.

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Equipment intended for use with hot water is marked for a maximum inlet water temperature.

Equipment intended for use with steam is marked for a maximum inlet steam pressure.

Equipment intended for use with a refrigerant other than water has the type of refrigerant and the design pressure marked on the unit.

Equipment intended for cooling only is so marked.

A fan-coil unit containing a refrigerant coil that has been additionally investigated as part of a specific split-system central cooling air conditioner, special purpose air conditioner or heat pump is also identified as part of that system under the Listings of "Air Conditioners, Central Cooling" (ACAV), "Air Conditioners, Special Purpose" (ACVS), or "Heat Pumps" (AGUX) in this Directory.

A fan-coil unit, as covered by these requirements, may be designed for free delivery of air to the room or may be provided with means for duct connection. Representative types include floor mounted, wall-mounted, ceiling hung, and wall or ceiling insert (built-in) units.

Fan-coil units consist of one or more factory made sections. If the equipment is provided in more than one section, each such section is designed for field interconnection with a matched section(s) to make the complete assembly. The listing shows the distinctive designation of each section comprising the assembly.

A room-type unit is designed to circulate air to the conditioned space directly; or by means of duct work having a static-pressure drop not exceeding 0.05 in. of water.

Units which incorporate factory-installed electric heaters are identified in the individual listings.

Where listed duct heaters (see Heaters, Duct in this List) are used in conjunction with cooling only fan-coil units designated in these listings by + in horizontal or up-flow operation, and the duct heater is installed downstream from the fan-coil unit so as to provide at least 4 ft spacing between the nearest fan-coil unit and duct heater surfaces, tests have indicated that no adverse thermal effects are produced.

The suitability of the electrical interconnection of the fan-coil unit and duct heaters is subject to the jurisdiction of the local inspection authority.

Fan-coil units which have been found suitable for use with duct heaters for mounting arrangements, other than indicated above are designated in these listings as described in the following paragraph.

Electric resistance heaters (including duct heaters) which are suitable for field installation in conjunction with fan-coil units are identified in this section of the Directory (1) by the type or model designation of the heaters and (2) by the type or model designation of the fan coil units with which it is suitable.

See Listings under "Room Fan-Heater Units" for appliances which are similar to Listed fan-coil units with electric resistance heaters but are not provided with a refrigerant, steam or water coil.

Fan-coil units which have been found suitable for use with Listed air conditioning equipment accessories are identified in the individual listings. See "Air-Conditioning Equipment Accessories" in this Directory.

The basic standard used to investigate products in this category is UL883, "Fan-Coil Units and Room-Fan Heater Units".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fan-Coil Unit", "Section of Fan-Coil Unit" or "Accessory For Fan-Coil Unit."

FAN UNITS (LZSY)

This category covers fixed equipment intended to be connected to a duct system which supplies conditioned air for environmental heating and/or cooling. The units consists of a motor operated fan or blower and may have air control dampers. The units may be thermostatically operated by integral or remote controls. The units do not include factory installed heat exchangers or other integral heating or cooling means.

Fan units which have been investigated and found suitable for use with field installed Listed Air Conditioning Equipment Accessory (ABFY) heater assemblies are identified in the individual Listings. The specific heater assemblies intended for such use are identified by marking on the fan unit. Fan units with these field installed heater accessories are the equivalent of Electric Central Heating Furnaces (KOVX).

The units are to be used in duct systems with air at temperatures not exceeding the marked inlet air temperature rating of the units.

Other types of fans for duct connection are covered under the categories "Fans, Electric" and "Ventilators, Power".

The basic standard used to investigate products in this category is UL883, "Fan-Coil Units and Room-Fan Heater Units".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as

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illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Fan Unit".

HEAT RECOVERY VENTILATORS, DUCTED (LZTW)

This category covers fixed equipment intended to remove air from buildings, replace it with outside air and in the process transfer heat from the warmer to the colder air. The equipment is intended to be connected to duct systems that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air. For Heat Recovery Ventilators, Non-Ducted see Guide LZUU.

The basic standard used to investigate products in this category is UL1812, "Ducted Heat Recovery Ventilators".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name as appropriate: "Ducted Heat Recovery Ventilator" or "Accessory for Ducted Heat Recovery Ventilator".

HEAT RECOVERY VENTILATORS, NON-DUCTED (LZUU)

This category covers stationary or fixed equipment intended to remove air from buildings, replace it with outside air and in the process transfer heat from the warmer to the colder air. The equipment is not intended to be connected to a duct system, other than the short duct runs necessary to bring air to and from the equipment. For equipment designed to be connected to ducts that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air, see Heat Recovery Ventilators, Ducted (LZTW).

The basic standard used to investigate products in this category is UL1815, "Non-Ducted Heat Recovery Ventilators".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Non-Ducted Heat Recovery Ventilators".

PLENUM AIR TERMINAL UNITS (LZVF)

This category covers fixed appliances which include a motor operated fan or blower with or without electric resistance heaters. The appliances are intended to be installed in plenums above hung (suspended) ceilings where the inlet air to the appliance is taken from this plenum space.

The air outlet may be free discharge or ducted to ceiling diffusers.

The units are intended for installation in accordance with the Standard of the National Fire Protection Association for Installation of Air Conditioning and Ventilating Systems 90A and Article 300-22(C) of the National Electrical Code.

The units are to be installed in accordance with the manufacturer's installation instructions. The nameplate on the unit references the installation instruction manual number to be used or the unit is provided with permanent markings having specific instructions for the installation.

When Listed Duct Heaters (KOHZ) are used in conjunction with units designated in these Listings by reference to Note 1 in this guide information in horizontal operation, and the duct heater is installed downstream from the unit so as to provide at least 4 ft spacing between the nearest unit and duct heater surfaces, and the unit is not provided with factory or other field-installed heaters, tests have indicated that no adverse thermal effects are produced.

The suitability of the electrical interconnection of the unit and the remote mounted Listed duct heaters is subject to the inspection authority.

For additional information, see Heating, Cooling, And Ventilating Equipment (LZLZ).

The basic standard used to investigate products in this category is UL 1096, "Electric Central Air-Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Plenum Air Terminal Unit."

ROOM AIR TERMINAL UNITS (LZVR)

This listing covers units designed to be connected to the terminal end of a single duct supplying air from a remotely located air handling unit and for installation in a single room for the purpose of providing heating, ventilating and/or cooling.

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The unit types include floor mounted, wall-mounted, ceiling hung, and wall- or ceiling- insert constructions.

Units incorporating electric heat have an automatic resetting temperature limiting control which is intended to protect against abnormal operating conditions and, in addition, each unit is provided with a replaceable or manually resettable thermal cutoff.

The proper installation of these units requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the volume of air passing through the units and the ambient temperatures of the input air.

Units incorporating electric heat may have provision for interlocking the air supply and the electric element circuit.

Units may include provision for a coil designed for cooling by refrigerant or chilled water, or heating by steam or hot water, or for combinations of such coils.

The basic standard used to investigate products in this category is UL1096, "Electric Central Air-Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Room Air Terminal Unit".

ROOM FAN-HEATER UNITS (LZXU)

This category covers fixed appliances which include a motor operated fan or blower and electric resistance heater, or an electrically heated heat exchanger. The appliances are designed to serve a single room or space. Listings include units similar to fan-coil units with electric resistance heaters but which are not provided with a refrigerant, steam or water coil, and units similar to air heaters but which draw in air from outside the heated space. Listings of air heaters appear under Heaters, Air.

A room fan heater unit may be designed for free delivery of air to the room, or may be provided with a means for connection of a short extension duct. Representative types include floor mounted, wall-mounted, ceiling hung, and wall or ceiling insert (built-in) units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated in the main guide information (LZLZ). This information also appears on printed cards published by Underwriters Laboratories Inc. and available from the manufacturer.

The basic standard used to investigate products in this category is UL883, "Fan-Coil Units and room-Fan Heater Units".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Room Fan-Heater Unit."

VENTILATING UNITS (LZYW)

This category covers units which consist of a motor operated blower and electric resistance heaters. The units may also incorporate means for evaporative cooling. These units are intended to supply heated and/or cooled air to commercial and industrial buildings from which air is being exhausted by other equipments. There is no provision for return-air circulation on these units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated in the main guide information (LZLZ). This information also appears on printed cards, published by Underwriters Laboratories Inc. and available from the manufacturer.

The basic standard used to investigate products in this category is UL1096, "Electrical Central Air-Heating Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Section of Ventilating Unit" or "Ventilating Unit".

HYDROMASSAGE BATHTUBS (NCHX)

USE AND INSTALLATION

This category covers indoor hydromassage bathtubs (also known as whirlpool baths) rated 250 V or less, for residential and commercial use, for permanent connection to the building plumbing, and intended for

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installation and use in accordance with Article 680 of the National Electrical Code, NFPA 70. They are intended for either permanent connection to the electrical supply or are provided from the factory with a maximum 3 ft. type SJ or equivalent service cord terminating in a grounding type attachment plug. A hydromassage bathtub may have provision for a maximum of two supply sources.

A hydromassage bathtub consists of a drainable tub, a recirculating pump and optional equipment such as lights, a heater, a control and an air-blower. A bathtub may also be provided with an air-blower and no recirculating pump or with an integral shower unit.

Hydromassage bathtubs are intended to be protected by a ground-fault circuit interrupter.

Double Insulation — Hydromassage bathtubs may utilize double insulated pumps. These pumps are marked "Double Insulated" or "Double Insulation." Double insulated pumps intended for permanent connection to the supply may or may not have provision to terminate an equipment grounding conductor. Cord connected double insulated pumps may be provided with a power supply cord terminating in a nongrounding type attachment plug. Double insulated pumps are not provided with a pressure wire connector for equipotential bonding.

The physiological effect of using this equipment has not been determined. The suction fittings used in these hydromassage bathtubs have been evaluated with respect to body and hair entrapment in accordance with ASME/ANSI A112.19.8M-1987.

INSTRUCTIONS/MARKINGS

Factory Configuration Information — Each hydromassage bathtub is provided with a making on the wiring diagram, in the installation instructions or on a separate configuration sheet, to identify the factory-installed components of the unit. These components include pumps, controls, heaters, lighting fixtures, and supply cords. This configuration marking and the installation instructions are intended to be available during installation and inspection.

Field-installed Options — Field-installed options that have been investigated and found to be suitable for addition to the unit are specified in the installation instructions.

RELATED PRODUCTS

Portable hydromassage equipment is covered under Personal Hygiene and Health Care Appliances (QGRZ). This category does not cover hydrotherapy tubs used in health care facilities. For professional equipment, refer to Medical and Dental Equipment, Professional (KFBQ) under Health Care Facilities Equipment (KEVQ). For prefabricated steam baths and showers, refer to Prefabricated Assemblies, Sections and Units (QQXX). For sauna and steam bath heating equipment, refer to Heaters, Sauna and Steam Baths (KPJV). Self-contained spas and hot tubs are covered under Self-contained Spas (WCZW) in the Electrical Construction Equipment Directory.

For unjetted plastic bathtubs, shower stalls, and the like tested in accordance with the applicable ANSI Z124 series standards, refer to Plastic Plumbing Fixtures (QNNP) in the Plumbing and Associated Products Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1795, "Hydromassage Bathtubs."

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of hydromassage bathtubs that not only meet the appropriate requirements of UL but also have been investigated in accordance with Standards or parts detailed below. These products are intended for installation and use in accordance with the applicable model plumbing code.

1. ASME/ANSI A112.19.7M+, "Requirements for Whirlpool Bathtub Appliances."

2. Water retention test requirement from ASME/ANSI A112.19.7M+.
+ Issue date of standard or latest addendum

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hydromassage Bathtub."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: "Also Classified IN ACCORDANCE WITH *,/" where "*" is one of the texts detailed below:

1. ASME/ANSI A112.19.7M+

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2. WATER RETENTION TEST REQUIREMENT FROM ASME/ANSI A112.19.7M+.

+ Issue date of standard or latest addendum

INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT (NWGQ)

GENERAL

This category covers equipment, appliances and systems rated 600 V or less normally found in offices and other business establishments, residences (homes), educational facilities, and other similar environments classified as ordinary locations.

Equipment in this category has been evaluated for installation in information technology equipment (computer) rooms as defined in ANSI/NFPA 75, "Protection of Electronic Computer/Data Processing Equipment" and Article 645 of ANSI/NFPA 70, "National Electrical Code" (NEC), unless the equipment is otherwise identified by a marking or instruction.

EQUIPMENT TYPE

Equipment may be electronic or electromechanical in design or a combination thereof.

Various groupings of equipment are included for the manufacturers, such as:

Information processing equipment: automated information storage equipment, central processing units (CPUs), disk drives, fiber optic transceivers, hand-held computers (personal assistants), lap-top computers, monitors, personal computers, plotters, printers, point-of-sale terminals, scanners, including portable bar-code scanners, tape drives, workstations.

Telecommunication equipment: cellular site equipment, cordless telephone sets, facsimile machines, ISDN systems and telephones, modems, key telephone systems, private automated branch exchanges (PABXs), telephone answering machines, telephone sets, voicemail systems, wireless telephony systems.

Office appliances: adding machines, bursters, calculators, collators, dictation and transcribing machines, electric typewriters, erasers, folding, embossing and sealing machines, label printers, microfilm readers, motor operated file cabinets, paper cutters, paper shredders, pencil sharpeners, sorters, stackers, staplers.

Reproduction equipment: copiers, duplicating machines, microfilm printers, mimeograph machines.

Mailing, banking and currency handling equipment: cash registers, coin counters, -feeders, -dispensers, accounting machines, check-writing, -assigning, -dating, -inserting, -mailing, -numbering and -stamping machines, point-of-sale terminals.

Multi-media equipment/accessories: CD-ROM/RW drives, digital cameras, microphones, speakers, video conferencing systems.

Network equipment: baluns, bridges, hubs, nodes, repeaters, routers, switches, transceivers.

PC card accessories: PCMCIA-memory, -modem cards.

Wireless (RF, infrared) transceiving equipment: RF modems, hand-held computers with integral transceivers.

Static neutralizing equipment: power units with discharge bars used with or within copiers, collators, film plate processors, digital printers, duplicating machines and similar equipment.

Interconnecting cable assemblies: cable assemblies intended for use beneath raised floors of computer rooms. These assemblies also may be found under Computer Interconnection Cable Assemblies (DVPJ) in the Electrical Construction Equipment Directory.

Included within the above groupings is equipment which is battery powered, either by standard size consumer replaceable batteries (e.g., AA, C, D), or nonstandard sizes specified by manufacturer, type and ratings.

This category also covers power distribution units (PDUs) and computer power centers, which are evaluated as part of the computer system for use exclusively in information technology equipment (computer) rooms in accordance with Article 645 of the NEC. This equipment is connected to branch circuits, and it distributes power to other units in the computer system by means of interconnecting cable assemblies complying with one or more of the wiring methods outlined in Article 645 of the NEC. Many of these units require special installation, such as a separate transformer, special grounding methods, motor generator equipment, air conditioning, etc. Such features are covered in the manufacturer's installation instructions.

RELATED EQUIPMENT

Power distribution centers for communications equipment are covered under Power Distribution Centers for Communications Equipment (QPQY).

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Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ) and Power Supplies, Telephone (QQJE).

Static neutralizing equipment may be covered under Static Neutralizing Equipment (VWWZ). High voltage parts that may be accessible after installation have been evaluated as Limited Current Circuits.

Air conditioning equipment for use in computer rooms or other areas in which information technology equipment is installed is covered under Air Conditioning Equipment (AAYZ).

Fire resistant materials, sprinklers, extinguishers and associated equipment required for compliance of computer rooms with ANSI/NFPA 75 are covered in the Fire Protection Equipment Directory, Fire Resistance Directory or Building Materials Directory.

Filing cabinets covered under this category have not been investigated with respect to fire resistance or security. Fire resistant filing cabinets are Listed in the Building Materials Directory under Record Protection Equipment (RYPH).

Smoke detectors and alarm equipment are found in the Fire Protection Equipment Directory.

Other equipment associated with information technology/processing but not intended for use in offices, residences or computer rooms may be found under Graphics Arts Equipment (KCQT), Teaching and Instruction Equipment (WYFW), Medical and Dental Equipment, Professional (KFBQ), Marking and Coding Equipment, Electronic (PGBE), Photographic Equipment (QINT) and X-ray Equipment (ZQOR). Other multi-media equipment and accessories may be found under Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ). Other telecommunications appliances and equipment may be found under Telephone Appliances and Equipment (WYQQ) and Telephone Dialers (WYTU).

Modular assemblies of telecommunication equipment (e.g. racks, circuit card assemblies) which are designed for field installation by trained service personnel are covered under Custom-Built Telecommunication Equipment (WYKM).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies and similar network communication companies, is covered under Communication Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunications equipment, but include components and assemblies that are intended to power, protect, heat, cool or otherwise support IT or telecommunications equipment that will be installed at a later time are covered under Information Technology and Telecommunication Equipment Cabinets, Enclosures and Racks (NWIN).

SPECIAL CONSIDERATIONS

Card readers, badge readers and similar identification equipment covered under this category have not been investigated with respect to security. Equipment investigated with respect to security or burglary resistance is Listed or Classified in the Security Equipment Directory.

The burglary and theft protection features of coin-operated equipment, banking and currency handling equipment, cash registers, coin counters and the like have not been investigated under this category.

Automated teller machines (ATMs) that have been investigated for security and burglary resistance are Listed under Automated Teller Systems (TPEU). ATMs that have not been investigated for security and burglary protection are Classified under Bank Equipment (BALT).

INSTALLATION

Some equipment has been evaluated for installation in a restricted access location, such as a dedicated equipment room or telecommunication equipment closet, where access is limited to trained service personnel. Such equipment is provided with a marking or installation instructions which state "To be installed only in a Restricted Access Location" or similar wording. If also intended for installation over a concrete or noncombustible surface, such equipment will also be marked "Suitable for mounting on concrete or other noncombustible surface only" or similar wording.

Equipment installed in a restricted access location generally receives power from a centralized d.c. power source. If field wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of the NEC.

Equipment, such as LAN transceivers and baluns, which are evaluated for installation in an environmental air space, are provided with a marking or installation instruction which states "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(C) of the National Electrical Code," or similar wording. Such equipment has been investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces."

When Listed equipment intended for use with a detachable power supply cord is not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit is to be separately provided.

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Equipment intended to be installed in closed and multi-unit standard racks and cabinets has been determined to be suitable for use in ambient temperatures not exceeding the manufacturer's recommended ambient temperature as specified in the equipment's installation instructions.

Equipment identified with an enclosure type designation, or as "Rain-tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

OUTPUT CONNECTORS/CIRCUITS

Class 2 circuits are marked "Class 2." All other output circuits, including those associated with the Universal Serial Bus (USB), IEEE 1394 bus and PS/2 connectors are limited power circuits supplied by UL 60950 limited power sources, unless:

- the circuits are clearly telecommunication circuits (e.g., RJ series modular jack, 50 pin commercial connectors with insulation piercing terminals). These circuits are limited to telecommunication network voltages (TNV) and are suitable for connection to the telecommunication network and distribution wiring in accordance with Article 800 of the NEC; or
- the circuits are marked, or otherwise identified in the installation instructions with the type of circuit (e.g., Class 1), intended cable type (e.g., DP-2) or specific equipment intended to be interconnected (e.g., mfg/model printer).

Limited power circuits of listed ITE supplied by limited power sources are recognized by Section 725.41(A)(4) of the NEC as being equivalent to Class 2 circuits for purposes of applying Article 725 Class 2 wiring requirements.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been evaluated.

The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been evaluated. Hand-held transportable RF products with interconnect to the telecommunication network through RF transmitters/receivers are additionally investigated for short-term characteristics to ANSI/IEEE C95.1-1999, "Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

ACCESSORIES

Field-installed accessories to Listed equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic Listed equipment specified in the markings or instructions.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60950 and UL 1950, "Safety of Information Technology Equipment." The ability or reliability of these products to perform their intended function in a particular application has not been evaluated.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following category identifiers: "UL 1950," "UL 60950," "Information Technology Equipment," "NWGQ," "I.T.E.," or "Info. Tech. Equip.," and may also include one of the following product names, as appropriate: "Copier," "Modem," "Paper Shredder," "Personal Computer," "Cordless Telephone" or another appropriate product name as shown in the individual Listings. The category identifier for field-installed accessories is provided with the additional word "Accessory."

LAMPS (OOKH)

LAMPS, SELF-BALLASTED AND LAMP ADAPTERS (OOLR)

USE AND INSTALLATION

This category covers fluorescent self-ballasted lamps that incorporate a nonreplaceable light source and lamp adapters for use with a replaceable light source, for installation in Edison base lampholders in incandescent luminaires and portable lamps operating at 120 V 60 Hz nominal.

This category also covers self-ballasted lamps and lamp adapters intended for installation in other ANSI base type lampholders for operation on other voltages as marked on the product.

This category also covers self-ballasted lamps employing LED lights.

Products in this category are provided with integral protection that prevents overheating and which meets the requirements of Underwriters Laboratories Inc. for Class P fluorescent lamp ballasts.

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Products are marked to indicate the environmental conditions for which they have been evaluated: dry, damp or wet locations. See Electrical Equipment for Use in Ordinary Locations (AALZ) for the definitions of these locations.

These products are not intended for use in emergency lighting equipment or exit fixtures.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1993, "Self-Ballasted Lamps and Lamp Adaptors."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self-ballasted Lamp" or "Lamp Adapter" or other appropriate product name as shown in the individual Listings. The complete four element Listing Mark will appear on the smallest unit container in which the product is packaged when the product is of such a size that only the UL logo can be applied to the product.

LAMPS, SPECIALTY (OONB)

This category covers specialty lamps, usually of the common bulb shapes, containing assemblies of light sources (such as miniature incandescent bulbs, light emitting diodes) and associated electrical components, and provided with bases of various sizes, usually of the standard configurations covered in the standard for Electric Lamp Bases, ANSI C81.61-1990.

These lamps are intended for use in Listed equipment, such as exit fixtures or exit lights, where the product marking specifies the use of a lamp covered in this category.

Interchangeability of these lamps with commonly available lamps has not been evaluated by Underwriters Laboratories Inc.

In addition to the Classification Marking, the lamp or the smallest unit container is marked with the wattage, voltage, manufacturer's identification and catalog number.

The basic standard used as a guide to investigate products in this category is UL 496, "Edison Base Lampholders".

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product or the smallest unit container, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

**Specialty Lamp
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.**
For Use in Products Marked
To Use UL Classified Lamp, _____ + _____ ++
++-Company identification
++-Lamp catalog number
(Control Number)

TUNGSTEN HALOGEN, LAMPS (OOOJ)

The products covered in this category are tungsten halogen lamps employing an integral shield that has only been investigated in accordance with the Underwriters Laboratories Inc. guard and shield requirements applicable to lighting products for use with tungsten halogen lamps. These requirements are contained in the Standard for Portable Electric Lamps, UL 153.

These lamps may be used in all UL Listed lighting products with or without a containment barrier where permitted by the product markings.

In addition to the Classification Marking, the lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer and model number.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of the Underwriters Laboratories Inc on the product or on the smallest unit package is the only method provided by Underwriters Laboratories Inc to identify a Classified shielded tungsten halogen lamp.

**CLASSIFIED BY
UNDERWRITERS LABORATORIES INC
FOR PARTICLE
CONTAINMENT ONLY**

MEDICAL EQUIPMENT (PIDF)

USE AND INSTALLATION

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This category covers equipment intended to diagnose, treat, or monitor a patient under medical supervision and which makes physical or electrical contact with the patient and/or transfers energy to or from the patient and/or detects such energy transfer to or from the patient.

This equipment includes those accessories as defined by the manufacturer which are necessary for the normal use of the equipment.

Unless otherwise noted, this equipment is designed for professional use by qualified personnel in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, and in remote areas under the direction of qualified personnel, in accordance with the instructions specified by the manufacturer.

This equipment has been Classified with respect to electric shock, fire, mechanical and other specified hazards incident to its use in ordinary locations. The other specified hazards are those which are included in UL 2601-1 and the Particular and/or Collateral Standards to which the equipment has been evaluated.

The wiring methods for installation of these products are covered by Article 517 of NFPA 70, "National Electrical Code" (NEC). The individual units of a system may be designed to be interconnected by means of one or more of the wiring methods outlined in the NEC.

The nature of some of this equipment, such as X-ray, nuclear imaging, and magnetic resonance equipment, is such that it involves features of installation and use not ordinarily presented in utilization equipment. Such features are covered in the manufacturer's installation instructions. Installation must, if possible, be made in a room or compartment in which provision is made to prevent fire or injury to persons and, in all cases, be in accordance with the manufacturer's installation instructions furnished with the equipment and the requirements of the Authorities Having Jurisdiction.

X-radiation safety and performance requirements are regulated under Public Law 90-602 and are enforced by the U.S. Department of Health and Human Services. These criteria are outlined in Code of Federal Regulations, Title 21, Parts 1000 to 1999. Compliance with the applicable regulations under the conditions of normal and abnormal operation has not been investigated by UL.

Some of the Medical Equipment Classifications are predicated on the provision of one of two alternate attachment plugs specifically referred to in Attachment Plugs, Fuseless (AXUT) in the Electrical Construction Equipment Directory. One is a locking type identified by the marking "Hospital Only" and the other is a nonlocking type ANSI Standard configuration grounding type identified by the marking "Hospital Grade" and a green dot on the body. The identification is visible after installation on the flexible cord.

Baby incubators, and similar equipment for use with oxygen enriched atmospheres, have been investigated with respect to the increased hazard resulting from the presence of oxygen and electrical parts within the equipment. Motor operated beds are marked if they are suitable for use with oxygen. It is not possible to make devices such as these inherently safe from external sources of ignition. This hazard is greatly increased by the presence of oxygen, which makes materials easier to ignite and greatly increases the burning rate. Accordingly, for safety, it is essential that all possible sources of ignition be kept away from these devices. Possible sources of ignition against which precautions should be taken include open flames, matches, cigarettes, accumulations of static electricity, and reducing valves on oxygen tanks which occasionally project flame and sparks due to ignition or explosion of rubber valve seats.

Oil bath sterilizers and similar equipment have been investigated with respect to their use with oils such as are recommended by the sterilizer manufacturer.

Products covered under this category include equipment intended to be field installed, in accordance with the instructions provided, to Classified equipment of the same manufacturer. The field-installed equipment is appropriately marked as noted below.

Individual components of the end products in this category have been investigated to applicable UL component requirements. Also, investigation of components to applicable international component requirements has been performed by UL or other appropriate certifying agency (as determined by UL). UL Follow-Up Service at the end-product manufacturing facility also determines that such components continue to bear the appropriate designated certifying agency's mark.

REBUILT PRODUCTS

This category also covers medical equipment which is rebuilt by the original manufacturer or any other party that has the necessary facilities, technical knowledge and skills. Rebuilt medical equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt medical equipment is subject to the same requirements as new medical equipment.

UNEVALUATED FACTORS

The physiological effects, beneficial or otherwise, which may be produced by this equipment have not been investigated.

The effects of the combination of therapies arising from the use of this equipment with other medical equipment have not been investigated.

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RELATED PRODUCTS

Medical equipment that includes refrigerated components, such as refrigeration therapy equipment, is covered under Refrigeration Equipment (SCER).

Equipment that has been investigated to determine its suitability for use in hazardous locations as defined in the NEC is covered under Medical Equipment for Use in Hazardous Locations (PINR).

For household health care equipment, see Personal Hygiene and Health Care Appliances (QGRZ). For heating pads, see Heating Pads, Electric (MNUV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2601-1, "Safety of Medical Electrical Equipment, Part 1: General Requirements."

Particular Standards — UL 2601-1 contains requirements for safety which are generally applicable to all medical equipment. For certain types of equipment, these requirements are supplemented or modified by the special requirements of a Particular Standard (IEC 60601-2-XX). However, unless otherwise indicated in the deviations, the requirements of a Particular Standard do not modify the deviations. Where Particular Requirements exist, the General Standard is not used alone.

Collateral Standards — When the equipment falls within the scope of one or more Collateral Standards (IEC 60601-1-XX) such standard(s) may, optionally, also be used. Unless otherwise indicated in the deviations, the requirements of a Collateral Standard do not modify the deviations.

Product Marking (with respect to applicable standards) — As part of the Classification Mark the reference to the UL 2601-1 Standard is included. For products that have been evaluated in accordance with the applicable Particular (IEC 60601-2-XX) and/or Collateral (IEC 60601-1-XX) Standards, reference to these standards is made on the product or in the accompanying documents.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product name "Medical Equipment" or other appropriate product name as shown in the individual Classifications, the statement "WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH," the standard number* and a control number.

Rebuilt or remanufactured products are prefaced by the words "Rebuilt," "Remanufactured" or "Reconditioned."

Field-installed products are prefaced by the words "Field Installed."

* Based on the certification coverage of the product, the standard number may be UL 2601-1, applicable Particular (IEC 60601-2-XX) and/or related Collateral (IEC 60601-1-XX) Standards for which the product has been found to comply by UL.

As an alternate, the Classification Mark includes the UL symbol in conjunction with the word "CLASSIFIED," the product name as described above, the phrase "See Accompanying Documents" or the symbol of a triangle containing the exclamation point (IEC 348, Symbol 14 - Δ), the standard number* and a control number. As a minimum, the standard number* always includes UL 2601-1. The accompanying documents contain the complete Classification Mark as described above.

MICROWAVE AND CABLE COMMUNICATION EQUIPMENT (POFV)

This category covers microwave communication equipment, cable communication equipment, communication antennas and antenna positioning equipment intended for household or commercial use.

For Listings of video tape recorders, video cameras and related accessories see Audio/Video Apparatus (AZSQ), Audio and Video Equipment (AZUJ), and Video Equipment (ZBYR).

Equipment Listed has been investigated with respect to risk of fire, electric shock and personal injury. Where such equipment is included in systems which involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury have included only the equipment specifically Listed in the individual listings.

ANTENNA POSITIONING EQUIPMENT (POJQ)

This category covers satellite or microwave antenna positioning products and accessories intended for household or commercial use, such as: satel-

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lite and microwave antenna rotating systems (azimuth and elevation positioning) and similar products that do not employ a Cathode-Ray-Tube display.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standards used to investigate products in this category are UL 150, Antenna Rotators, and UL 1409, Low-Voltage Video Products Without Cathode-Ray-Tube Displays.

Products of the above types may also be Listed under the categories Audio/Video Apparatus (ASZQ) and Audio And Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Microwave and Cable Communication Equipment", "Satellite Antenna Positioning Equipment", "Microwave Antenna Positioning Equipment", "Antenna Positioning Equipment", or "...Product", or the name of the specific type of product as shown in the individual Listings, or combinations of the preceding identities.

CABLE COMMUNICATION EQUIPMENT (POMV)

This category covers cable TV receiving, transmitting and processing appliances and accessories intended for household or commercial use, such as: communication networks, cable TV tuners, power supplies, signal amplifiers, converters, decoders, descramblers, interconnection cables, user communication devices for interactive cable systems (terminals and signaling devices), remote channel changers, and similar products that do not employ a Cathode-Ray-Tube display.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standard used to investigate products in this category is UL 1409, Low-Voltage Video Products Without Cathode-Ray-Tube Displays. (Provisions for field connections of fixed wiring systems are investigated in accordance with applicable portions of UL 1950, Safety of Information Technology Equipment, Including Electrical Business Equipment).

Products of the above types may also be Listed under the categories Audio/Video Apparatus (AZSQ) and Audio And Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Microwave and Cable Communication Equipment", "Communication Equipment", "Cable Communication Equipment", "Cable Television Equipment", "Cable Equipment", or "...Product", or appropriate product name, as shown in the individual Listing.

COMMUNICATION ANTENNAS (POQQ)

This Listing covers satellite or microwave receiving and transmitting antennas and accessories intended for household or commercial use, such as: satellite antenna dishes, microwave antenna horns or waveguides, receiving and transmitting antennas, antenna mounting/support hardware (tripods, masts, polar mounts) and similar products.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standards used to investigate products in this category are UL 1409, Low-Voltage Video Products Without Cathode-Ray-Tube Displays. (Field wiring is investigated to the applicable portions of UL 1950, Information Technology Equipment including Electrical Business Equipment and UL 873, Electrical Temperature-Indicating and -Regulating Equipment).

Products of the above types may also be Listed under the categories Audio/Video Apparatus (AZSQ) and Audio/Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Microwave and Cable Communication Equipment", "Satellite Antenna Equipment", "Microwave Antenna Equipment", "Antenna Equipment", or "...Product", or appropriate product name, as shown in the individual Listing.

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MICROWAVE COMMUNICATION EQUIPMENT (POTV)

This category covers microwave or satellite, receiving, transmitting and processing appliances and accessories intended for household or commercial use, such as: microwave communication networks, power supplies, signal amplifiers, down converters, decoders, descramblers, interconnection cables, user communication devices for interactive systems (terminals and signaling devices), and similar products that do not employ a Cathode-Ray-Tube display.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standard used to investigate products in this category is UL 1409, Low-Voltage Video Products Without Cathode-Ray-Tube Displays. (Provisions for field connections of fixed wiring systems are investigated in accordance with applicable portions of UL 1950, Safety of Information Technology Equipment, Including Electrical Business Equipment).

Products of the above types may also be Listed under the categories Audio/Video Apparatus (AZSQ) and Audio And Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Microwave and Cable Communication Equipment", "Microwave Communication Equipment", "Satellite Communication Equipment", or "...Products", or appropriate product name as shown in the individual Listing.

MICROWAVE COMMUNICATION EQUIPMENT CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (POVJ)

These products are retrofit kits consisting of parts intended for field installation in microwave communication equipment. These products have been evaluated by UL to determine that when installed in accordance with the manufacturer's instructions they do not adversely affect the operation of the Specified Equipment. The installation instructions provided with each kit provide the information identifying the specific equipment into which the kit may be installed.

For additional information see the Guide Information for Microwave and Cable Communication Equipment (POFV).

The basic Standard used to investigate these retrofit kits is UL 1409, Low-Voltage Video Products Without Cathode Ray Tube Displays.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (as shown below) on the product, together with the control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

Microwave Communication Equipment
Retrofit Kit
Classified By
Underwriters Laboratories Inc. ®
For Installation in Specified
Microwave Communication Equipment
Identified in the
Manufacturers Installation Instructions.

OFFICE FURNISHINGS (QAWZ)

The office furnishings covered by this listing are portable and consist of panels, study carrels, work stations and pedestal-style systems that may be mechanically interconnected to form an office furnishing system to be installed in accordance with Article 605 of the National Electrical Code. These may be provided with an electrical distribution system, including switches, and receptacles. They may contain channels for routing communication cables within the system components separate from power circuit raceways. The systems may include filing cabinets, desks, work surfaces, shelves, storage units and the like that have a particular electrical or mechanical function unique to an office furnishing system.

Partitions that extend to the ceiling or that are used to support the building structure are not Listed as office furnishings. They may be Listed as Prefabricated Sections and Units or Classified as Composite Panels with respect to one or more model Building Codes, Plumbing Codes, National Electrical Code, a State Building Code and/or an applicable local building code.

The surface burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on site construction. Finish surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 450 or less.

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Products specifically designed and arranged for field installation in individual designs of office furnishings such as lighting units, receptacles, clocks, power distribution elements, work surfaces, shelves, etc, are covered as accessories under the individual listing and are marked to identify the specific office furnishing with which they have been investigated. Lighting units for use with office furnishings are Listed under Office Furnishing Lights, QAXB.

Office furnishings are marked with the designation of one of the following three types:

Type I - A system that includes all parts and contains pre-wired modular raceways and accessories necessitating only quick-connect type of electrical interconnections. A Type I system may be shipped with the accessories installed in the panel, or field installed where marked for use in the system. Means for permanent wiring connections to the branch circuit supply are provided.

Type II - A system that provides raceways and devices for routing and termination of wiring. All wiring is installed in the field.

Type III - A system that is not intended to be wired and has no provision for routing and termination of wiring.

The basic standard used to investigate products in this category is UL 1286, "Office Furnishings".

This category also covers office furnishings and office furnishing accessories which are rebuilt.

Rebuilt office furnishings and rebuilt office furnishing accessories are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt office furnishings and rebuilt office furnishing accessories are subject to the same requirements as new office furnishings and office furnishing accessories.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and "Office Furnishing", Office Furnishing Accessory", "Rebuilt Office Furnishing", or "Rebuilt Office Furnishing Accessory".

OFFICE FURNISHING LIGHTS (QAXB)

The office furnishing lights covered by this Listing are for use with office furnishings when installed in accordance with Articles 410 and 605 of the National Electrical Code. This Listing includes both freestanding and mounted lights that may be electrically or mechanically connected to an office furnishing. Products specifically designed and arranged for use with an individual design of office furnishing are marked to identify the specific office furnishing with which they have been investigated.

Products that require electrical assembly in the field are covered as kits or light accessories under the individual Listing. Kits and light accessories are completely wired to the extent permitted by the intended field installation, with all splices and connections completed and with all electrical components mounted.

A kit forms a complete office furnishing light when assembled in accordance with the instructions provided.

A light accessory and the required office furnishing or a combination of light accessories form a complete office furnishing light when assembled in accordance with the instructions provided.

The basic standards used to investigate products in this category are UL 153, Portable Electric Lamps; UL 1570, Fluorescent Lighting Fixtures; UL 1571, Incandescent Lighting Fixtures; UL 1572, High Intensity Discharge Lighting Fixtures; and UL 1286, Office Furnishings.

The following designations are used to specify the type(s) of Product(s) Listed under this category. Presence of a particular Roman Numeral in an individual Listing indicates products of that type are covered. The "type" numerals denote the following:

- II - Incandescent
- III - Fluorescent
- VI - Tungsten Halogen
- XII - High Intensity Discharge (HID)
- XVI - Kits
- XVII - Light Accessories

Types I, IV, V, VII-XI, and XIII-XV are reserved.

This category also covers office furnishing lights which are rebuilt.

Rebuilt office furnishing lights are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt office furnishing lights are subject to the same requirements as new office furnishing lights.

Office furnishing lights or office furnishing light accessories which comply with the requirements in: UL 1570, Fluorescent Lighting Fixtures; UL 1571, Incandescent Lighting Fixtures; or UL 1572, High Intensity Discharge Lighting Fixtures, may also be Listed as Fixtures or Fixture Fittings, respectively, in the Electrical Construction Equipment Directory.

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Office furnishing lights which comply with the requirements in UL 153, Portable Electric Lamps, may also be Listed as Portable Lamps, in the Electrical Appliance and Utilization Equipment Directory.

Office furnishing light accessories which comply with the requirements in UL 153, Portable Electric Lamps, may also be Listed as Portable Lamp Kits or Portable Lamp Subassemblies, in the Electrical Appliance and Utilization Equipment Directory.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory) together with the word "LISTED", a control number and "Office Furnishing Light", "Office Furnishing Light Kit", "Office Furnishing Light Accessory", or "Rebuilt Office Furnishing Light."

PORTABLE LIGHTING PRODUCTS (QOTU)

GENERAL

This category covers lampshades, nightlights, office furnishing lights, portable cabinet luminaires, portable luminaire kits and subassemblies, portable luminaires, portable work lights, and sun and heat lamps.

RELATED PRODUCTS

Portable lighting products and associated furnishings evaluated for use together are covered under Furnishings, Household and Commercial (IYQX).

Portable lighting products used as hand lamps are covered under Portable Electric Hand Lamps (QORX) or Portable Hand Lamp Accessories (QOSV).

Portable lighting products intended for seasonal use are covered under Christmas Tree and Decorative Outfit Accessories (DGWU), Outfits, Decorative (DGXW) or Strings, Decorative Lighting (DGZZ).

Portable lighting products intended for use in hazardous (classified) locations are covered under Portable Lighting Units for Use in Hazardous Locations (QPKX).

Portable lighting products intended for temporary use (such as at construction sites or car sales lots) are covered under Temporary Lighting Strings (XBRT).

Portable lighting products intended for theatrical use are covered under Stage and Studio Luminaires and Connector Strips (IFDZ).

PORTABLE CABINET LUMINAIRES (QOVJ)

USE AND INSTALLATION

This category covers surface and recess mounted portable cabinet luminaires intended for installation into open or enclosed portable cabinets such as china hutches, bookcases, bars, consoles, bed headboards, and similar locations.

These products are not intended for installation in recessed walls or ceilings, or in permanently installed cabinets where the wiring is concealed or passed through openings in the structure.

Portable cabinet luminaires have been evaluated for mounting in accordance with the clearances marked on the product. Portable cabinet luminaires not marked with clearances may be mounted as close to any surface as permitted by the housing, an integral mounting flange, bracket, or spacer.

A restrictive marking is provided for portable cabinet luminaires intended for use only in open top cabinets. Portable cabinet luminaires without the restrictive marking are evaluated for a 13 mm (1/2 in.) minimum clearance from the top.

Presence of the Roman numerals in an individual Listing indicates products of that type are covered. The "type" numerals denote the following:

- II — Incandescent
- III — Fluorescent
- VI — Tungsten Halogen
- XII — High Intensity Discharge

Types I, IV, V, VII–XI and XIII–XV are reserved.

RELATED PRODUCTS

Incandescent or fluorescent luminaires intended for installation in permanently installed cabinets, where the wiring is concealed or passed through openings in the structure, are covered under Incandescent Surface Mounted Luminaires (IEZR) or Fluorescent Surface Mounted Luminaires (IEUZ) for surface mounting, or Incandescent Recessed Luminaires (IEZX) or Fluorescent Recessed Luminaires (IEVV) for recessed mounting.

Low voltage luminaires intended for installation in permanently installed cabinets, having a remote power source connected to a fixed wiring means, are covered under Low Voltage Incandescent Luminaires and Fittings (IFDR).

Portable cabinet luminaires that have been evaluated for use with specific cabinet or display designs are Listed along with the cabinet or display as Furnishings, Household and Commercial (IYQX).

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ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Cabinet Luminaire" or "Portable Cabinet Light."

LUMINAIRES, PORTABLE (QOWZ)

GENERAL

This category covers portable luminaires (lamps) whose primary function is task or ambient illumination. These products are provided with a flexible cord and an attachment plug for connection to a nominal 120 V, 15 or 20 A branch circuit and intended for use in accordance with NFPA 70, "National Electrical Code."

The following designations are used to specify the type(s) of product(s) covered under this category. Presence of the Roman numerals in an individual Listing indicates products of that type are covered. All companies in this category may produce products of types II and III even though these designations do not appear in the individual Listings. The "type" numerals denote the following:

- II — Incandescent Units
 - III — Fluorescent Units
 - IV — Specific Features (with toy, motor, transformer, electronic circuits, etc.)
 - VI — Tungsten Halogen Units
 - VII — See Listings of Portable Luminaire Kits and Subassemblies (QPAU)
 - VIII — Convertible Units (Products Convertible to Luminaires)
 - IX — Interchangeable Units
 - X — Track-Style Units
 - XII — HID Units
 - XIII — Neon Units
 - XIV — Wet Location Units
- Types I, V and XI are reserved.

PRODUCT MARKINGS

Products evaluated as Convertible Units (VIII) are marked to indicate acceptability as a luminaire when used with the appropriate conversion kit.

Products evaluated for use in wet locations are marked, in combination with the UL Listing Mark, "Suitable for Wet Locations."

REBUILT PRODUCTS

This category also covers portable luminaires that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt portable luminaires are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt portable luminaires are subject to the same requirements as new portable luminaires.

RELATED PRODUCTS

Portable luminaires that comply with the requirements in UL 48, "Electric Signs," may also be Listed as Signs (UXYT).

Unassembled portable luminaires are covered under Portable Luminaire Kits and Subassemblies (QPAU).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Luminaire," "Portable Lamp," "Rebuilt Portable Luminaire" or "Rebuilt Portable Lamp."

LAMPSHADES (QOXZ)

This category covers lampshades intended for use on incandescent and fluorescent types of portable lamps (QOWZ) and provided with a means of assembly to the portable lamps. These lampshades are intended for use in specific building environments that are identified as or considered by the authorities having jurisdiction to be high risk occupancies including hotels, nursing homes, hospitals and educational institutions.

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Products Classified under this category exhibit resistance to propagation of flames beyond the area exposed to a source of flaming ignition before and after accelerated aging exposure. In addition, these products exhibit resistance to ignition when directly exposed to the heat from a 300 W light bulb both before and after accelerated aging exposure.

The flame resistance of these lampshades may be inherent in the material used or may be the result of chemical treatment to retard ignition and spread of flame.

The basic standard used to investigate products in this category is UL 214 "Tests For Flame Propagation Of Fabrics And Films".

Authorities having jurisdiction should be consulted in all cases as to the specific requirements covering the acceptance and use of these Classified products in the intended occupancies.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) is the only method provided by UL to identify products which have been produced under its Classification and Follow-Up Service.

**LAMP SHADE
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
WITH REGARD TO FLAMMABILITY AND RESISTANCE TO
IGNITION ONLY**

NIGHTLIGHTS (QOYX)

This Listing covers night lights for direct plug-in use in parallel slot, general purpose receptacles rated 15 or 20 A, 125 V.

Lighting Products intended for use as night lights, but provided with a power supply cord appear under the heading "Lamps, Portable".

Parallel blade to incandescent lamp adaptors appear under the heading "Lampholder Adaptors" in the Electrical Construction Equipment Directory.

The basic Standard used to investigate products in this category is UL 1786, "Night lights".

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word "Listed", a control number, and the following product name: "Night light."

PORTABLE LUMINAIRE KITS AND SUBASSEMBLIES (QPAU)

USE AND INSTALLATION

This category covers portable luminaire kits and subassemblies of the following types:

Portable Luminaire Kit — The portable luminaire kit is intended to be used for making a complete portable luminaire using ordinary tools to assemble and/or attach the parts to a support base in accordance with the instructions provided with the kit. All parts needed to assemble the product in accordance with the instructions are provided.

Portable Luminaire Subassembly — The portable luminaire subassembly is intended to be used for modernizing, or replacing defective parts on existing luminaires in accordance with the instructions provided with the subassembly. It may also be used for constructing a new portable luminaire in accordance with the instructions provided with the subassembly. All electrical components needed to assemble the product in accordance with the instructions are provided.

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Lamp Kit," "Portable Luminaire Kit," "Portable Lamp Subassembly" or "Portable Luminaire Subassembly."

PORTABLE WORK LIGHTS (QPCJ)

USE AND INSTALLATION

This category covers cord and plug connected work lights for illumination of work areas such as construction sites, loading docks, and machinery work stations. Work lights are not intended to be hand held during

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use. Work lights are not intended for use in hazardous (classified) locations as defined in NFPA 70, "National Electrical Code."

This category also covers work light accessories intended for use with specific work lights.

Work lights may be freestanding, clamp-on, or similar portable mounting means, or be provided with a means for mounting to a tool, machine or a similar movable object.

Work lights may be placed on combustible floors. Special care must be employed to avoid overturning and to keep away from draperies, furniture, etc.

PRODUCT MARKINGS

A work light marked "Dry Location Use" is intended to be used only in a dry location.

A work light marked "Suitable For Wet Location Use" is intended for use in a wet or dry location.

A work light marked "Suitable For Outdoor Use Only" is suitable for use in a wet location and is intended to be used only in an outdoor location.

RELATED PRODUCTS

Portable outdoor flood lights for illumination or landscape, outdoor decorations, patios and play areas are covered under Luminaires, Portable (QOWZ), suitable for wet locations.

For other portable lighting products, see Luminaires, Portable (QOWZ) and Portable Electric Hand Lamps (QORX).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Work Light," "Portable Work Light" or "Work Light Accessory."

SUN AND HEAT LAMPS (QPDY)

This listing covers portable sun and heat lamps of the household variety intended for the production of ultraviolet (sun) radiation, infrared (heat) radiation, or both.

The physiological effects, beneficial or otherwise, which may be produced by these lamps have not been investigated.

For sun and heat lamps intended for professional use, see "Medical and Dental Equipment, Professional."

The basic standard used to investigate products in this category is UL482, "Portable Sun/Heat Lamps".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Infrared Lamp", "Ultra-Violet Lamp", "Heat Lamp" or "Sun Lamp".

TELECOMMUNICATION EQUIPMENT (WYIE)

Listing of the following products appear in this section:

Custom-Built Telecommunication Equipment

Telephone Appliances and Equipment

Telephone Dialers

Telephones, Cellular.

Telephone power supplies are Listed under "Power Supplies, Telephone" (QQJE). Telecommunication Equipment covered under this category has not been evaluated for use in computer/information technology rooms as defined in the "Standard for the Protection of Electronic Computer/Data Processing Equipment", NFPA 75. Computers and related equipment, including telecommunication equipment, that interface with electronic data processing systems and are intended for use in computer/information technology rooms are Listed under "Data Processing Equipment, Electronic" (EMRT) or "Information Technology Equipment" (NWGQ).

Telecommunication equipment which is identified as suitable for outdoor locations is marked with an enclosure type designation or as "Rain tight" or "Rainproof" and is intended for use as indicated in the guide information for Equipment for Use in Ordinary Locations (AALZ). Telecommunication equipment not marked as suitable for outdoor locations is

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for indoor use only and the acceptability of such equipment when installed in semi-protected or otherwise shielded locations is determined by the authority having jurisdiction.

Unless marked to indicate special circuit characteristics (such as "Class 2" or "Class 3") or another specific function (such as "keyboard"), telecommunication type output connectors (such as RJ series modular jacks, 50 pin commercial connectors, and insulation piercing terminals) of telecommunication equipment are limited to telecommunication circuit levels and are suitable for connection to typical telecommunication networks and distribution wiring installed in accordance with Article 800 of the National Electrical Code (NEC), NFPA 70.

Certain types of telecommunication equipment are intended to be installed on telecommunication lines protected by a secondary protector and are marked to indicate this fact. Secondary protectors are Listed under "Secondary Protectors for Communication Circuits" (QVRG).

Certain types of telecommunication equipment are Listed as accessories for use only with other Listed equipment or systems and are identified by the word "Accessory".

Telecommunication equipment and their accessories that are suitable for mounting in air-handling spaces, as covered by Section 300-22(c) of the NEC, are specifically identified by markings on the product and in the individual Listings.

Unless indicated otherwise in the guide information preceding the specific subcategories, the basic standard used to evaluate this equipment is UL 1459, Telephone Equipment, or, UL 1950, Safety of Information Technology Equipment, Including Electrical Business Equipment.

The requirements of UL 2043, Fire Tests for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air Handling Spaces, are used to evaluate nonmetallic materials of products marked suitable for use in air-handling spaces.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the appropriate product name or category identification as indicated in the guide information for each subcategory.

CUSTOM-BUILT TELECOMMUNICATION EQUIPMENT (WYKM)

This category covers custom-built, modular telecommunication equipment and accessories that include various combinations of cabinets, racks, circuit card assemblies, power supplies, and the like designed for field installation by trained service personnel. They are intended for installation in accordance with Article 800 of the National Electrical Code, NFPA 70.

This equipment is intended to be installed and maintained by local exchange carriers (LECs), inter-exchange carriers (IXCs), and similar operating telecommunication companies which provide service to the subscriber premise and access to the public network.

Complete telephone equipment (i.e. PABXs, telephones, telephone answering machines, etc.) are Listed under "Telephone Appliances and Equipment" (WYQQ).

Telephone dialers that deliver a recorded message are Classified under "Telephone Dialers" (WYTU).

Custom-built telecommunication equipment is intended to be installed only in restricted access locations, such as equipment rooms or closets, where access is limited to trained service personnel, unless it is installed in a Listed rack, cabinet, or similar enclosure identified with an installation code "E".

Some units may have accessible parts (such as the output terminals of a low power ring-generator power supply) that operate at Class 3 voltage levels. The location of these units either in the restricted access location or in the final system configuration is intended to be such that unintentional contact with these parts is unlikely.

Unless identified with an installation code "B", or "E", Custom-built telecommunication equipment is intended to be installed only over a non-combustible surface or in a Listed rack, cabinet, or similar enclosure that is identified with an installation code "B", or "E".

Custom-built telecommunication equipment is intended to be configured in a system and installed in accordance with the manufacturer's installation instructions and the network carrier's installation practices. In order to ensure proper coordination of the individual units in the final installation, letter codes are provided to identify significant input, output, and installation parameters. These are divided into three categories: Power Codes (PC), Telecommunication Codes (TC), and Installation Codes (IC).

POWER CODES (PC)

Power Codes provide information relating to the type of power required to be supplied to the unit (input) or the type of power supplied by the unit (output).

C As an input code, this designation requires the power inputs to the unit to be limited to normal telecommunication levels. Acceptable

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sources of power are Listed Telephone Power Supplies identified as having "Level C" outputs, Listed Custom-Built Telecommunication Equipment with an output code "C" or communication line powering from Listed Telephone Equipment or the public network.

As an output code, this designation indicates that the outputs are limited to normal telecommunication levels (Level C) and are suitable for connection to typical telecommunication networks and distribution wiring which are installed in accordance with Article 800 of the National Electrical Code, NFPA 70.

F As an input code, this designation requires the power inputs to the unit to be provided with overcurrent protection or be otherwise power limited. Acceptable sources of power are Listed Telephone Power Supplies identified as having "Class 2" or "Level C" outputs, a Listed Class 2 power source or Listed Custom-Built Telecommunication Equipment with an output code of "F" or "C".

L As an output code, this designation indicates that the unit provides power limited outputs that are intended to be used for Custom-Built Telecommunication Equipment in the same system. These outputs have not been evaluated as Class 2 circuits or communication circuits unless identified as such.

As an input code, this designation requires that, with overcurrent protection bypassed, the power source supplying the unit be limited to 250 VA and the current source be limited to 1000/V max. Acceptable types of limited power sources are Listed Class 2 power supplies, a Listed Telephone Power Supply with outputs identified as being source limited or Listed Custom-Built Telecommunication Equipment with a power output code "L".

As an output code, this designation indicates that, with overcurrent protection bypassed, the unit provides power outputs that are source limited to 250 VA with the current limited to 1000/V max.

The following table summarizes acceptable power sources for units with input power codes C, F and L.

These Power Source	May Supply Unit With An Input Power Code (PC):
Output Power Code (PC) "L"	L
Output Power Code (PC) "F"	F
Output Power Code (PC) "C"	L, F, C
Class 2 Power Source	L, F
Communication Circuits (e.g. Public Network)	L, F, C
Listed Telephone Power Supplies with Identified "Level C" Outputs	L, F, C
Listed Telephone Power Supplies with Identified "Source Limited" Outputs	L

TELECOMMUNICATION CODES (TC)

Telecommunication Codes provide information relating to the characteristics of the telecommunication circuits that may be connected to the unit.

T Provided as an output code, this designation indicates that the equipment provides isolation from "exposed" circuits requiring protection in accordance with Section 800-30 of the National Electrical Code, NFPA 70.

X As an input code or as an output code, this designation indicates that the input or output telecommunication circuits are suitable for connection to "exposed" circuits requiring protection in accordance with Section 800-30 of the National Electrical Code, NFPA 70. Absence of this code is an indication that the equipment is intended to be isolated from "exposed" circuits by equipment with an output code designation "T".

INSTALLATION CODES (IC)

Installation Codes provide information relating to the location and/or installation of the unit.

A Where provided, this designation indicates that additional information is provided regarding the installation of the unit. Such information may be provided in the form of a permanent tag or information sheet attached to the unit.

B Where provided, this designation indicates that the equipment provides side and bottom enclosures that minimize the risk of spread of fire. Cabinets, racks, and similar equipment identified with an installation code "B" are not intended to completely enclose or limit accessibility to Listed subassemblies mounted within the enclosure and are, therefore, not for use outside of restricted access locations.

E Where provided, this designation indicates that the equipment provides a complete enclosure for parts that may present a risk of electric shock, electrical energy-high current levels, or fire and limits accessibility to these parts. Cabinets, racks, and similar equipment identified with an installation code "E" are intended to enclose and limit accessibility to Listed subassemblies mounted within the enclosure and may be used outside of restricted access locations.

The codes are marked in the following format:

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Marking On Units	IN	OUT
(Power Code) (PC)	F	C
(Telecommunication Code) TC	X	T, X
(Installation Code) IC	A	

In this example, the "F" Power Code (PC) for the input indicates that the power inputs require overcurrent protection from the equipment that provides power to this unit. The "C" Power Code (PC) for the output indicates that the outputs are limited to levels compatible with communication wiring systems. The "X" input Telecommunication Code (TC) means that the communication circuit inputs are suitable for connection to exposed circuits. The "T" Telecommunication Code (TC) for the output indicates that the unit provides isolation between the exposed circuits connected at the input and the telecommunication output ports. The "X" Telecommunication Code (TC) for the output indicates that the output circuits are also suitable for connection to exposed circuits. The "A" Installation Code (IC) indicates that additional important installation information is provided on a tag or an attached information sheet. The lack of any other installation codes indicates that the equipment must be installed in restricted access locations over a noncombustible surface or mounted in a suitable enclosure with an "E" or "B" installation code.

Power supplies and assemblies containing power supplies or power distribution components are marked with electrical ratings. Assemblies that present a load on the power system are marked with a load or input rating. The total load ratings for any system should not exceed the power supply/distribution ratings.

Custom-built telecommunication equipment is intended to be installed or situated in a location or position that does not cause excessive heat build-up or interfere with its proper ventilation.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Custom-Built Telecommunication Equipment", "Custom Tel Eq.", or "Custom Telecom".

TELEPHONES, CELLULAR (WYLR)

USE

This category covers hand-held cellular telephones, transportable cellular telephones, and cellular telephone voice-dialers that may be used in households or commercial establishments, or on a vehicle, boat or the like where the telephone interconnects with the telephone network through a radio transmitter and receiver.

UNEVALUATED FACTORS

Possible physiological effects of these devices have not been evaluated.

RELATED PRODUCTS

Cell site equipment and similar equipment that forms the "base station" for a cellular communications network, and incorporates the interface to the wired telecommunication network, controllers, amplifiers, and transmitting/receiving equipment is covered under Telephone Appliances and Equipment (WYQQ) or Information Technology Equipment Including Electrical Business Equipment (NWGQ).

ADDITIONAL INFORMATION

For additional information, see Telecommunication Equipment (WYIE) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 6500, "Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use" or UL 1492, "Audio-Video Products and Accessories" or UL 60950, "Safety of Information Technology Equipment," as well as the product certification requirements to current FCC Regulations.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Telephone" or "Telephone, Cellular" or other appropriate product name as shown in the individual Listings.

TELEPHONE APPLIANCES AND EQUIPMENT (WYQQ)

This category covers appliances and equipment connected into telephone lines such as telephones, telephone answering devices, telephone dialers which do not deliver a recorded message key telephone systems and private branch exchanges.

Telephone dialers which deliver a recorded message are Classified under "Telephone Dialers" (WYTU).

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Modular assemblies (i.e. racks, circuit card assemblies) that are designed for field installation by trained service personnel are Listed under "Custom-Built Telecommunication Equipment" (WYKM).

Certain types of telephone appliances and equipment have been evaluated for installation only over a noncombustible surface and are marked to indicate this fact.

Certain types of telephone appliances and equipment have been evaluated for installation only in restricted access locations, such as equipment rooms or closets where access is limited to trained service personnel, and are marked to indicate this fact.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone Appliance", "Telephone Equipment", "Telecommunication Equipment", "Telephone Answering Appliance", "Telephone Call Diverter", "Automatic Dialer", or the appropriate product names, as shown in the individual Listings.

TELEPHONE DIALERS (WYTU)

Telephone dialers are electrically operated signal units which automatically dial a telephone line when activated, and are designed to deliver a prerecorded message either by electrical variations on the telephone line or audio transmission into a telephone handset. All dialer units are capable of dialing one or more numbers by mechanical or electrical means.

Telephone dialers have been classified only with respect to their safety when connected to telephone lines or a power supply circuit. Burglary, fire, or other emergency signaling functions of the device have not been evaluated.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®
AS TO ELECTRICAL SHOCK AND FIRE HAZARDS ONLY.**

**BURGLARY, FIRE, OR OTHER EMERGENCY SERVICE
PERFORMANCE OF THE PRODUCT HAS NOT BEEN EVALUATED.**

TELEPHONE EQUIPMENT, LEGACY INSTALLATIONS (WYXR)

USE

This category covers equipment with remote feeding telecommunication circuits intended for backwards compatibility in legacy telecommunication equipment.

This equipment is limited to that which forms part of a telecommunication network up to and including the demarcation point. The circuitry associated with this type of equipment is intended to be installed and located in service access areas only, which may or may not be provided by the equipment housing. This equipment is generally considered central office equipment, though it may be deployed elsewhere in similarly controlled environments.

PRODUCT TYPES

Examples of types of equipment covered under this category are:

Circuit packs or cards with existing or new technologies designed to be installed into shelf assemblies that form part of a service provider's existing infrastructure.

Shelf assemblies intended as replacements for existing shelf assemblies mounted in frame line-ups that form part of a service provider's existing infrastructure.

Shelf assemblies or enclosures intended as replacements for existing service provider infrastructure equipment that are required to be compatible with cards or circuit packs already in service.

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 391, "Outline of Investigation for Equipment with Remote Feeding Telecommunication Circuits Intended for Backwards Compatibility in Legacy Telecommunication Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Pack," "Shelf Assembly," or other appropriate product name as shown in the individual Listings.

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TOOLS (XJXX)**TOOLS, SEMI-AUTOMATIC
WOODWORKING EQUIPMENT (XKHS)****USE AND INSTALLATION**

This category covers production and accessory equipment for attended or unattended fabrication or modification of material used in manufacturing products or subassemblies in industrialized or commercial applications. The equipment has a total connected power of 3.7 kw (5 hp) or greater or is rated three-phase. Equipment in this category is designed to be set up for specific manufacturing applications, such as cutting, drilling, planing, or other modification of materials of wood or plastic laminate. The equipment is intended to be installed in accordance with the National Electrical Code, NFPA 70 and Electrical Standard for Industrial Machinery, NFPA 79.

SPECIAL CONSIDERATIONS

Devices included in this category are not intended for the handling of hazardous material. The use of some equipment involves certain inherent hazards related to the risk of injury that cannot be wholly eliminated by practical design features. Such hazards have been reduced to an acceptable degree in the Listed equipment.

RELATED EQUIPMENT

Self-sustaining production equipment designed to be programmed for the assembly of products or subassemblies in a specific manufacturing application, such as assembly of components, packaging, sorting, or counting of parts, and which only incorporates manufacturing processes involving heating or cooling, drying, or gluing of parts are covered by Factory Automation Equipment (GPNY) in the Electrical Construction Equipment Directory.

Robotics and associated control equipment are covered under Robots and Robotic Equipment (TETZ) in the Electrical Construction Equipment Directory. Industrial Control Panels are covered under their own category (NITW) in the Electrical Construction Equipment Directory.

Equipment that may be used in residential applications is covered under Tools, Stationary (XKJU).

Equipment intended primarily for identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing and quality-control procedures are covered under Inspection and Measuring Equipment (NYRW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REBUILT EQUIPMENT

This category also covers rebuilt semi-automatic woodworking equipment that may or may not be rebuilt by the original manufacturer. Rebuilt semi-automatic woodworking equipment is factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt semi-automatic woodworking equipment is subject to the same requirements as new semi-automatic woodworking equipment.

REQUIREMENTS

The basic requirement used to investigate products in this category is Subject 2385, "Outline of Investigation for Semi-automatic Woodworking Equipment."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name, "Semi-automatic Woodworking Equipment" or other appropriate product name. For rebuilt semi-automatic woodworking equipment the product name is preceded by the word "Rebuilt," "Refurbished" or "Remanufactured."

TRADESHOW EQUIPMENT (XNRI)**USE AND INSTALLATION**

This category covers equipment intended for indoor use for the purpose of illuminating, animating, activating, or displaying with respect to temporary expositions, exhibits, show conventions, meetings or assemblies. These units are for temporary construction and display at exposition events and are intended to be installed and used in accordance with Article 518 of the National Electrical Code, NFPA 70. The requirements of the Authorities Having Jurisdiction should be consulted regarding use of these devices and equipment before installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

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**EXHIBITION DISPLAY UNITS,
ACCESSORIES (XNRU)****USE**

This category covers accessories consisting of equipment that is complete and is specifically and solely for use in the tradeshow industry as peripheral or related devices. This includes convention center cord sets.

PRODUCT MARKINGS

Convention center cord sets are surface marked "Parallel Convention Center Cable for Temporary Tradeshow Use Only."

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI).

REQUIREMENTS

The basic standards used to investigate convention center cord sets are UL 2305, "Exhibition Display Units - Fabrication and Installation" and UL 817, "Cord Sets and Power-Supply Cords."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit - Accessories."

**EXHIBITION DISPLAY UNITS, CUSTOM
(XNSA)****USE AND INSTALLATION**

This category covers devices consisting of custom-built panels, sections or complete exhibition display units.

Custom exhibition display units are uniquely designed for display at a particular exhibition, show, meeting or assembly. The unique construction design is intended to be used for a particular product, service or organization.

Custom exhibition display units are built partially or wholly on site.

SURFACE BURNING CHARACTERISTICS

The surface burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 200 or less.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2305, "Exhibition Display Units - Fabrication and Installation."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit - Custom."

**EXHIBITION DISPLAY UNITS, PORTABLE
AND MODULAR (XNSN)****USE AND INSTALLATION**

This category covers portable tradeshow displays, hanging components and other exhibit assemblies that may be interconnected to form an exhibition display unit.

Portable exhibition display units are intended to be moved. They are hand carried and set up without tools and/or a ladder. They do not require trained personnel to setup.

Modular exhibition display units are systems consisting of a series of components that are tubular in design, and are mechanically connected together to form the supporting structure of an exhibition display unit or portion of a unit. A modular system uses a locking means of connection whereby the strength and integrity of the connection is maintained. Elements of these systems are intended to be used repeatedly in various configurations.

SURFACE BURNING CHARACTERISTICS

The surface burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 200 or less.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2305, "Exhibition Display Units - Fabrication and Installation."

UL MARK

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit."

EXHIBITION DISPLAY UNITS, REBUILT (XNST)

This category covers rebuilt exhibition display units.

Rebuilt exhibition display units are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI).

REQUIREMENTS

Rebuilt exhibition display units are subject to the same requirements as new exhibition display units. See Exhibition Display Units, Custom (XNSA) and Exhibition Display Units, Portable and Modular (XNSN).

The basic standard used to investigate products in this category is UL 2305, "Exhibition Display Units – Fabrication and Installation."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rebuilt Exhibition Display Unit."

VENTILATORS, POWER (ZACT)

GENERAL

This category covers roof- and wall-mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof- and wall-mounted power ventilators have a weather resistant housing and are supported by a weather resistant base intended to fit, usually by means of a curb, over a wall or roof opening.

These ventilators are intended primarily for commercial or industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust type and makeup air type devices. Makeup air type ventilators equipped for evaporative cooling are covered under Humidifiers (AHIV).

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with the Authority Having Jurisdiction.

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RELATED PRODUCTS

For ventilators intended for the primary removal of grease-laden vapors and residues over restaurant cooking appliances, see Power Ventilators for Restaurant Exhaust Appliances (YZHW).

For other types of fans and blowers, see Fans, Electric (GPWV) and Fan Units (LZSY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 705, "Power Ventilators."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Ventilator."

INDUSTRIAL MATERIAL HANDLERS (ZAJJS)

USE

This category covers products intended for continuous movement of material laden air.

The instruction manual states these devices are intended for exhausting, material conveying, pollution control and air circulation. These devices are Classified as to risks of electric shock and mechanical hazard only.

RELATED PRODUCTS

Ventilation equipment is covered under Power Ventilators (ZACT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 705, "Power Ventilators."

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**INDUSTRIAL MATERIAL HANDLER
AS TO ELECTRIC SHOCK AND MECHANICAL HAZARD ONLY
Control No.**

2003 General Information for Selected Categories from the Fire Protection Equipment Directory

PART V

Fire Protection Equipment (AAFP)

I. GENERAL

This directory includes equipment intended for fire protection purposes, including fire suppression equipment and systems, fire alarm equipment and fire fighting equipment, such as fire hoses, fire service protective clothing, and automotive fire apparatus. Also included are furnishings in buildings evaluated for combustibility, such as upholstered furniture, mattresses, and warehouse pallets.

Equipment covered in this directory is intended for use only as described in the general Guide Information for each product category and individual Listings. This equipment has been evaluated for use as described in the instructions and markings provided with the equipment. The use of the equipment in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been evaluated by UL.

II. CERTIFICATE SERVICE

Fire alarm systems require extensive installation work and maintenance by the Listed installing company. UL's Standards for these systems cover installation methods, extent of protection, and maintenance service, which are supervised under UL's Certificate Service.

Under Certificate Service, UL authorizes the issuance of UL's certificates to installations which the Listed installing company represents to be in compliance with requirements established for the product category. The certificate indicates the classification, extent, location of equipment, period covered by the certificate, and name of the installing company.

UL conducts countercheck field examinations of representative installations of the Listed installing company. UL assumes no liability for any loss that may result from failure of the equipment, incorrect certification or nonconformity with requirements. If installations not in compliance with UL's requirements are found as a result of field examinations, they are subject to correction by the Listed installing company or cancellation of the certificate.

A company's name in this directory does not indicate that all of the company's alarm system installations are covered under UL's Certificate Service. Only those installations for which a certificate has been properly issued are covered under UL's Certificate Service.

UL maintains a Certificate Verification Service (ULCVS) that allows Authorities Having Jurisdiction (AHJs) to verify up-to-date Certificate information and identify companies eligible to issue Certificates as of the date of the inquiry. Only those alarm or signal system installations for which a Certificate has been issued are covered under UL's Certificate Service. The verification of a Certificate on ULCVS is the only method UL provides to identify the Certificated alarm systems actively covered under its Listing and Follow-Up Service.

III. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Building materials evaluated with regard to surface burning characteristics such as flame spread and smoke developed during fire exposure, as well as building materials used for means of egress and roof vents are covered in UL's Building Materials Directory.

Electrical equipment and appliances, other than those described in this directory, are covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory. Electrical equipment intended for use in hazardous (classified) locations is covered in UL's Hazardous Locations Equipment Directory.

Fire resistance related assemblies, including fire resistant walls, columns, roofs, fire doors, windows, dampers, and through-penetration fire-stop systems used to protect openings in fire rated assemblies are covered in UL's Fire Resistance Directory.

Equipment used for the storing, containing, conveying, dispensing, regulating or use of flammable and combustible liquids and gases, and controls and detectors for the equipment in this directory are covered in UL's Flammable and Combustible Liquids and Gases Equipment Directory.

Equipment for use aboard marine vessels or in a marine environment is covered in UL's Marine Products Directory.

Gasoline-powered equipment and cleaning machines, and automotive fuel tanks and related equipment are covered in UL's Mechanical Equipment and Associated Products Directory.

Plumbing system appliances, fixtures, fittings and piping are covered in UL's Plumbing and Associated Products Directory.

IV. EVALUATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

V. INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are evaluated for the specifications or use conditions indicated in the general Guide Information for each product category.

The products covered in this directory are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

VI. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VII. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VIII. INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

IX. ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used.

If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of NFPA 70, "National Electrical Code" (NEC) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

PUMPING EQUIPMENT FOR FIRE SERVICE (QVUT)

The following information and listings relate to fire pumps, drivers, controllers and accessory equipment used in supplying water for fire protection purposes.

A fire pump unit generally includes the separately Listed fire pump, driver, controller, and other accessory equipment. The individually Listed products are intended to be installed and tested for acceptable performance in accordance with the requirements of the Standard of the National Fire Protection Association for the Installation of Centrifugal Fire Pumps, NFPA 20.

Authorities having jurisdiction should be consulted before installation.

BATTERY CHARGERS FOR USE WITH INTERNAL COMBUSTION ENGINES DRIVING CENTRIFUGAL FIRE PUMPS (QWIR)

This Category covers battery chargers for automatically controlling and maintaining the charge on batteries used to start internal combustion engines driving centrifugal fire pumps. The equipment consists of rectifying stacks, transformers, controlling relays, switches, and meters.

The basic standard used to investigate products in this category is UL1236, "Battery Chargers for Charging Engine Starter Batteries".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Battery Charger For Use With Fire Pumps".

PUMP CONTROLLERS, FIRE (QYZS)

This listing covers the following products:

- Fire Pump Controllers
- Circuit Breakers for Fire Pump Controllers
- Emergency Manual Operators
- Remote Alarm Panels

Fire pump controllers are intended for starting and stopping centrifugal fire pumps and include nonautomatic types and automatic types for electric driven pumps and combined manual and automatic types for engine driven pumps. Unless otherwise indicated, these controllers are intended for use with spark ignition (gasoline or natural gas) or diesel engines. Controllers suitable for use with spark ignition internal combustion engines are intended for such engines installed prior to 1974.

Fire pump controllers intended for starting and stopping foam concentrate pump motors, are marked "Foam Pump Controller" or "Limited Service Foam Pump Controller".

Controllers for electric driven, standard-size centrifugal fire pumps are intended for use with squirrel-cage or wound rotor motors rated 600 v or less.

Controllers for squirrel-cage motors may be for across-the-line starting or reduced voltage starting as indicated in the individual listings.

"Limited Service Controllers" are for across-the-line type squirrel-cage motors of 30 hp or less, 600 v or less. Authorities having jurisdiction should be consulted before installing controllers of these types.

Manually operable, open type circuit breakers are for use within enclosures of fire pump controllers.

Emergency manual operators are for use with internal combustion engines.

Some controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required marking.

The basic standard used to investigate products in this category is UL508, "Electric Industrial Control Equipment" and UL 218, "Fire Pump Controllers."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fire Pump Controller", "Limited Service Controller", "Foam Pump Controller", "Limited Service Foam Pump Controller".

PUMP CONTROLLERS, FIRE, OVER 600 V (QZGR)

This listing covers fire pump controllers having AC Voltage ratings in the range of 2.2 kV to 2.5 kV, 4.0 kV to 5.0 kV or 6.2 kV to 7.2 kV intended for starting and stopping centrifugal fire pumps and include nonautomatic types and automatic types for electric driven pumps.

These fire pump controllers are intended for use with squirrel-cage motors rated 7.2 kV or less.

Equipment in this category has been investigated for use on three-phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line to line open circuit voltage, and a phase factor of 1.73×10^{-6} .

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some fire pump controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

Fire pump controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required marking.

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Fire pump controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Fire pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

Fire pump controllers intended for starting and stopping foam concentrate pump motors are marked "Foam Pump Controller" or "Limited Service Foam Pump Controller".

The basic standards used to investigate products in this category are UL 347, "High Voltage Industrial Control Equipment" and ANSI/NFPA 20, "Centrifugal Fire Pumps".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "High Voltage Fire Pump Controller", "High Voltage Foam Pump Controller".

PUMP CONTROLLERS, FIRE, RESIDENTIAL (QZKE)

This Listing covers fire pump controllers intended for starting, stopping and protecting centrifugal fire pumps in one and two-family dwellings and mobile homes. These controllers are automatic or nonautomatic type for electric driven pumps.

Residential fire pump controllers are intended for use with squirrel-cage motors rated 250 V or less.

Equipment in this category has been investigated for use on single-phase alternating current circuits having available fault current levels not exceeding the short-circuit withstand rating appearing on the nameplate.

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Those controllers which are suitable for use as service equipment are so marked. Such marking is an integral part of other required marking.

These controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Residential pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment" and NFPA 20, "Centrifugal Fire Pumps", as applicable to limited service fire pump controllers.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Fire Pump Controller".

SIGNAL AND FIRE ALARM EQUIPMENT AND SERVICES (SYKJ)

Listings under this category include equipment for the detection, initiation, notification and control of signals indicative of fire, supervisory, watchman, releasing operation, and the control of the flow of smoke.

This category also covers service companies who are capable of certifying systems which comply with nationally recognized installation standards.

Listed equipment is intended to be installed, maintained, and operated as system arrangements in conformity with the following Standards of the National Fire Protection Association:

- NFPA No. 12
Carbon Dioxide Extinguishing Systems
- NFPA No. 12A
- Halon 1301 Fire Extinguishing Systems
- NFPA No. 13
Installation for Sprinkler Systems
- NFPA No. 15
Water Spray Fixed Systems
- NFPA No. 16
Deluge Foam-Water Systems
- NFPA No. 17
Dry Chemical Extinguishing Systems
- NFPA No. 17A
Wet Chemical Extinguishing Systems
- NFPA No. 72

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National Fire Alarm Code

NFPA No. 92A

Recommended Practice for Smoke-Control Systems

NFPA No. 92B

Recommended Practice for Smoke-Control Systems In Malls, Atriums, and Large Areas

Listings of equipment intended for general utility signaling service such as paging and intercommunication appear in the Electrical Appliance and Utilization Equipment Directory.

Users of this equipment should consult authorities having jurisdiction concerning the particular types to be used, number and location of appliances, character and installation of wiring, methods to be followed in the receipt and disposition of signals, keeping of records, rendering of reports and all other details having a bearing on adequate installation, maintenance and use of the system to be employed.

Listed equipment is subjected to investigation to determine its suitability for its intended service and for installation, maintenance and use in conformity with the applicable Standard of the National Fire Protection Association with particular regard to design and construction, practicability of application and reliability of performance in addition to the possible electrical hazards involved in its use.

A complete system is considered to be a combination of inter-related signal-initiating devices, signal-transmitting devices, signal-notification appliances and control unit installed in accordance with regulations enforced by the local inspection authority who determines the suitability of the installation for its particular application. The listing indicates that wiring diagrams have been submitted with the equipment which provide details for interconnecting it to other interrelated devices for the intended application. The interconnection details are shown on the equipment or are in a separate installation document provided with the equipment and referenced in the marking on the equipment by drawing number and issue date and/or revision level.

Equipment may be used in different combinations to form a system. All Listed equipment forming the system may be either of one manufacturer or of different manufacturers. The installation wiring diagram provided as a part of the Listed equipment should be consulted for specific details.

A system formed of separately Listed parts to provide a central station fire alarm system may be certificated by a company Listed under Protective Signaling Services - Central Station (UUFX).

A system formed of separately Listed parts to provide a local, auxiliary, remote station, or proprietary fire alarm system may be certificated by a company Listed under Protective Signaling Services - Local, Auxiliary, Remote Station, and Proprietary (UUIS).

DETECTORS, AUTOMATIC FIRE (UPLV)

These are either individual devices or prescribed combinations of devices designed to detect flame, heat, smoke, or combustion gases resulting from a fire and to automatically operate electrical signaling contacts. The signaling contacts may be integral parts of an individual device or parts of a separate device to which the detecting element is connected as an extended component.

The signaling contacts of the detector are intended to be connected to the circuit conductors of fire protective signaling systems recognized by the National Fire Protection Association Standards, so that the fire alarm signal initiated by the detector will be indicated by the system.

The kind of system (central station, proprietary, auxiliary, remote station or local) with which the detector can be used depends upon the design of the signaling circuit to which the detector contacts are intended to be connected. A detector may have non-coded signaling contacts connected directly to the actuating circuit of system control unit or to the actuating circuit of an electrically operated transmitter which will transmit coded signals over the signaling line circuit of a local, auxiliary, proprietary, remote station, or central station system.

The wiring diagram of the transmitter or system control unit with which the detector is used will indicate the circuit application of the detector.

A combination type detector depends upon two or more related but separate pieces of equipment which are designed to be installed together so as to form a complete detector.

Smoke-automatic Fire Detectors (UROX)

GENERAL

This category covers detecting combinations designed to detect smoke particles. Smoke detectors may or may not be designed to be connected to fire alarm system control units. See "Applications" section.

A heat detector and/or an audible signaling appliance may be provided integral with the detector.

The primary function of duct detectors is to shut down the blowers and/or dampers of air conditioning and ventilating systems in an attempt to prevent a possible panic and smoke damage from distribution of smoke. DUCT DETECTORS ARE NOT INTENDED AS A SUBSTITUTE FOR OPEN AREA PROTECTION.

The level of toxicity produced by the combustibles at which smoke detectors actuate has not been investigated by UL.

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The applicable UL performance standard for open area and releasing service detectors is UL 268. For duct detectors the applicable performance standard is UL 268A.

Refer also to Listings for Combination Door Closers and Holders (GTIS) in the Fire Resistance Directory, Volume 3, incorporating automatic smoke detection components.

Where model numbers are indicated in the Listings, 100 percent of the manufacturer's production for these models are required to bear the Listing Mark. Where model numbers are not indicated, the manufacturer is not obliged to have 100 percent of production bear the UL Listing Mark.

DETECTOR TYPES

Photoelectric (P) — Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or reflection of light from the smoke particles onto a light sensitive element.

Ionization (I) — An ionization smoke detector has a small amount of radioactive material which ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (P/I) — Employs both principles of detection in one unit.

Projected Beam (PB) — Light beam is projected across space of area to be protected.

Air Sampling (AS) — Consists of air sampling ports at ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

APPLICATIONS

Open Area Protection (OAP) — Requires detector connection to a compatible system control unit for operation.

Releasing Service (RS) — Intended for detector connection only to releasing devices, such as electromagnetic door holders, fire dampers, etc.

Open Area Protection with Releasing Service (OAP/RS) — Incorporates supplementary switching contacts for additional connection to releasing devices.

Duct Detector [D (ST)] — Intended for installation on side of duct. Employs sampling tubes which extend into duct.

Duct Detector [D (I)] — For installation inside duct.

COMPATIBILITY WITH CONTROL UNITS

Smoke detectors listed for open area protection are intended to be connected to the initiating device circuit of a fire alarm system control unit.

Multiple wire detectors, employing power supply terminals or leads that do not obtain power from the initiating device circuit of a system control unit, are compatible with any listed system control unit if failure of the power to the detector is supervised at the control unit.

Two wire detectors, whose power supply terminals or leads are the same as the signaling terminals, and obtain power from the initiating device circuit of a system control unit, are evaluated for compatibility either by test or a review of the circuit parameters of both the detector and control unit. Listing is restricted only to those control units with which such an evaluation was made. Interconnection limitations and compatible models are indicated on installation wiring diagram of control unit and/or detectors.

INSTALLATION

Standards — Refer to NFPA 72, "National Fire Alarm Code" and NFPA 90A, "Standard for Air Conditioning Systems" for installation, maintenance, and testing guidelines.

Spacings — Although there are no assigned spacings to these detectors, test fires, using the maximum amount of combustible for the risk involved, may be employed. See NFPA 72 for additional guidelines.

Environmental Considerations — Open area detectors are intended for indoor use only where normal ceiling temperatures [Max 37.8 C (100 F)] prevail. Care should be used that detectors are not installed in areas where conditions may cause unwanted (false) alarms.

Duct detectors are intended to be installed in ducts of heating, ventilating, and air conditioning systems where temperatures at the detector do not exceed 37.8 C (100 F).

Ionization detectors should not be used in an environment of high level radiation unless tests in the actual environment have shown that the radiation will not interfere with operation of the detectors.

Effect of Velocity — The velocities indicated in the individual Listings are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. The performance of photoelectric type detectors is not affected by velocity. Velocity limits for duct detectors are based on response to fire tests in UL 268A.

Stability Test — In view of the innumerable environmental conditions which exist in the field, it is recommended that the stability of detectors be monitored prior to connection to a fire alarm system for at least three

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months or more to screen out locations of detectors where unwanted alarms may occur. Relocation of the detectors, use of a detector with a different principle of operation, or a change in the sensitivity setting where permitted in the marking of the detector, may be required.

Authorities Having Jurisdiction should be consulted before installation.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name. A two Listing Mark System is employed for separable detector heads and bases. This permits the separate shipment of bases to facilitate installation and maintenance. The Listing Marks on the separable units, coupled with a marking cross reference between head and base, identifies the parts to be used together to complete a detector assembly.

Detectors with the designation "with integral audible signal" in the text of the UL Listing Mark include an audible signaling appliance in the unit (head or base) which is energized under an alarm condition.

Detectors with the designation "with integral heat detector" in the text of the UL Listing Mark include a heat detector in the unit which is connected internally to the smoke detector alarm circuit. Actuation of the heat detector results in the same alarm signal as obtained from the smoke detector.

NON-SEPARABLE HEADS AND BASES

1. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR OPEN AREA PROTECTION.
2. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR OPEN AREA PROTECTION. ALSO SUITABLE FOR RELEASING DEVICE SERVICE.
3. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR RELEASING DEVICE SERVICE.
4. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR DUCT APPLICATION.

SEPARABLE HEADS

5. SMOKE-AUTOMATIC FIRE DETECTOR (+) HEAD FOR USE WITH A (*) UL LISTED BASE.
6. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED BASE.
- 6A. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED BASE. ALSO SUITABLE FOR DUCT APPLICATION.
7. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED BASE. ALSO SUITABLE FOR RELEASING DEVICE SERVICE.
8. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR RELEASING DEVICE SERVICE WHEN USED WITH A (*) UL LISTED BASE.
- 8A. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR DUCT APPLICATION WHEN USED WITH A (*) UL LISTED BASE.
- 8B. SMOKE-AUTOMATIC FIRE DETECTOR HEAD WHEN USED WITH A (*) UL LISTED SMOKE DUCT DETECTOR HOUSING.

SEPARABLE BASES AND DUCT HOUSING

9. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.
10. AUTOMATIC FIRE DETECTOR BASE (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED HEAD.
- 10A. AUTOMATIC FIRE DETECTOR BASE (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR DUCT APPLICATION.
11. AUTOMATIC FIRE DETECTOR BASE (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR RELEASING DEVICE SERVICE.
- 11A. AUTOMATIC FIRE DETECTOR BASE (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR RELEASING DEVICE SERVICE AND DUCT APPLICATION.
12. AUTOMATIC FIRE DETECTOR BASE (+) FOR RELEASING DEVICE SERVICE WHEN USED WITH A (*) UL LISTED HEAD.
13. SMOKE-DUCT DETECTOR HOUSING FOR USE WITH (*) UL LISTED HEAD.

SEPARABLE SYSTEM ASSEMBLIES

14. SMOKE-AUTOMATIC FIRE DETECTOR PROJECTED BEAM SYSTEM UNIT.
15. SMOKE -AUTOMATIC FIRE DETECTOR AIR SAMPLING SYSTEM UNIT.
16. SMOKE-AUTOMATIC FIRE DETECTOR FOR DUCT APPLICATION SUBASSEMBLY.

*Company Name or File No. (SXXXX).

+To be inserted when applicable: "with integral audible signal," "with integral heat detector" or "with integral audible signal and heat detector."

Smoke-automatic Fire Detector Accessories (URRQ)

A smoke detector accessory is a device employed to supplement smoke detector operation when connected as part of a fire alarm system. The interconnection is indicated on the installation wiring diagram associated with the detector.

Authorities having jurisdiction should be consulted before installation.

Where model numbers are indicated in the Listings, 100 percent of the manufacturer's production for those models are required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100 percent of production.

The basic standard used to investigate products in this category is UL268, "Smoke Detectors for Fire Protection Signaling Systems".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "Smoke-Automatic Fire Detector Accessory".

Smoke Detectors for Special Application (URXG)

General — Devices included under this Listing are Smoke-Automatic Fire detectors employing a special construction different from conventional detectors and are designed to detect products of combustion in a specific location. THESE DETECTORS ARE NOT INTENDED AS A SUBSTITUTE FOR OPEN AREA PROTECTION.

Types of Detectors

Photoelectric (P): Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or relection of light from the smoke particles onto a light sensitive element.

Ionization(I): An ionization smoke detector has a small amount of radioactive material which ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (P/I): Employs both principles of detection in one unit.

Air Sampling (AS): Consists of air sampling ports at ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

Effect of Velocity — The velocities indicated in the individual listings are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. Velocity limits for duct detectors are based on response to fire tests in UL 268A.

Installation — These detectors are intended to be installed in accordance with the manufacturer's installation instructions, in a manner acceptable to the local authority having jurisdiction and in accordance with NFPA Standard No. 72 or other NFPA Standards which may apply, such as for extinguishing system applications. The sensitivity rating of the detector shall be taken into consideration with regard to installation in an area to be protected under operating conditions to guard against false alarms. The detectors may be connected to the initiating device circuits of Listed control units which provide audible alarm signals, or employed as part of an extinguishing system. Authorities having jurisdiction should be consulted in all cases before installation.

The basic standards used to investigate products in this category are UL 268, "Smoke-Automatic Fire Detectors" and UL 268A, "Smoke Detectors for Duct Application".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product names: "Smoke Detector For Special Application", or "Smoke Detector Accessory for Special Application".

FIRE ALARM DEVICES, SINGLE- AND MULTIPLE-STATION, AND ACCESSORIES (UTER)

The following listings cover single- and multiple-station heat and smoke detectors and related accessories intended to be installed in ordinary indoor locations in accordance with Chapter 2 of the National Fire Protection Association Standard No. 72 titled the National Fire Alarm Code.

The levels of toxicity produced by the combustibles at which single- and multiple-station fire alarm devices are actuated have not been investigated by the Laboratories.

For a description of the applicable Listing Mark refer to the sub-categories Single- and Multiple-Station Heat Detectors (UTFS) and Single- and Multiple-Station Smoke Detectors (UTGT).

Single- and Multiple-station Heat Detectors (UTFS)

The following listings cover single- and multiple-station heat detectors intended to be employed in ordinary indoor locations.

Single-Station Type.

Single-station heat detectors are self-contained units incorporating a releasing mechanism, operating mechanism, and an alarm mechanism. In operation, heat actuates the releasing element permitting stored energy (stored compressed gas or spring) embodied in the unit to sound an alarm. Temperature ratings and spacing limitations are given in individual listings.

Multiple-Station Type.

Multiple-station heat detectors are intended for use in fire alarm systems. These listings include thermally sensitive detector units which initiate a signal by releasing compressed gas from a storage cylinder through an alarm mechanism (or horn) to sound an audible signal. These devices are interconnected by tubing.

Individual listings give limitations on the maximum length of tubing between gas storage cylinder, detector units, alarm mechanisms and other system components, and on operating temperature ratings, spacing limitations (sensitivity), and other details pertinent to the use of these devices.

Both single- and multiple-station units employing compressed gas as the operating mechanism, employ a sight glass or visual indicator to check for loss of contents by leakage, tampering or operation.

Ordinarily these devices are intended for locations where normal ceiling temperatures prevail (below 100 F). Locations where temperatures at ceiling are likely to be unduly high, from sources of heat other than fire conditions such as boiler rooms, etc., demand special consideration. Under these conditions, alarm devices operating normally at higher temperatures and capable of withstanding high temperatures for long periods of time may be required. Care should be exercised to select alarm devices having the proper temperature rating to guard against false alarms from premature operation.

For ceiling temperatures not exceeding 100 F, the 136 to 165 F (ordinary) rating devices are recommended.

For ceiling temperatures exceeding 100 F, but not 150 F, the 174 to 212 F (intermediate) rating devices are recommended.

The spacings specified in individual listings are for flat, smooth ceiling construction of ordinary height, generally regarded as the most favorable condition for distribution of heated air currents resulting from a fire. Under other forms of ceiling constructions, reduced spacing of alarm devices may be required.

The placement and spacing of alarm devices should be based on consideration of the ceiling constructions, ceiling height, room or space areas, space subdivision, the normal ceiling temperature, possible exposure of the devices to abnormal heat conditions and to draft conditions likely to be encountered at the time of a fire.

The basic standard used to investigate products in this category is UL539, "Single and Multiple Station Heat Detectors".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Single Station Heat Detector", "Multiple-Station Heat Detector", "Single- and/or Multiple-Station Heat Detector", "Single- and/or Multiple-Station Heat Detector Accessory".

Single- and Multiple-station Smoke Alarms (UTGT)

USE

This category covers single- and multiple-station alarms intended to be employed in ordinary indoor locations of residential occupancies as defined in NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures" (1997 edition), section 4-1.6 group (d) one- and two-family dwellings. These units are intended only for locations where normal ceiling temperatures between 4.4°C (40°F) and 37.8°C (100°F) prevail.

This category also covers single- and multiple-station smoke alarms that have been performance tested to a minimum 10-year extended battery life under normal ambient conditions.

ALARM TYPES

Single Station — Self-contained units that incorporate a smoke chamber, an optional heat detector, and related electrical components to initiate an

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audible alarm signal from the unit when abnormal smoke or heat (when a supplementary heat detector is provided) actuates the unit. These devices may be energized from a commercial power supply source by means of permanent wiring in accordance with NFPA 70, "National Electrical Code," flexible supply cord, use of limited energy cable or equivalent wiring connected to the output of a suitable Class 2 power supply, or by one or more batteries.

Where a battery is employed as the main supply, its depletion below the level at which an alarm signal would be obtained is indicated by a distinctive audible trouble signal which persists for at least seven days.

Multiple Station — Similar to single-station units but provided with leads or terminals to permit the interconnection of single-station units so that actuation of any one unit results in actuation of the audible alarms of all units. The installation instructions (manual) indicate the maximum number of units that can be interconnected.

Refer to Chapter 8 of NFPA 72, "National Fire Alarm Code" and instruction manual provided with each smoke alarm for installation data. NFPA 72 includes installation requirements of fire warning equipment in family living units. This is intended to cover living areas only and not common usage areas of multifamily buildings such as corridors, lobbies, stairwells, etc.

Travel Alarm — Consists of a battery-operated smoke alarm provided with a mounting bracket for top of door mounting only. May also consist of a battery-operated single-station smoke alarm with the addition of a mounting bracket. The difference is indicated on the UL Listing Mark.

Alarm for Recreational Vehicles — UL 217 applies except more stringent environmental tests are conducted. Where applicable, supplementary devices and accessories for use with these units, such as a remote horn, are indicated in the individual Listings.

REBUILT PRODUCTS

This category also covers single- and multiple-station smoke alarms that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt single- and multiple-station smoke alarms are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt single- and multiple-station smoke alarms are subject to the same requirements as new single- and multiple-station smoke alarms.

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 217, "Single and Multiple Station Smoke Alarms."

Units marked "For The Hearing Impaired" also comply with the requirements of UL 1971, "Signaling Devices for the Hearing Impaired."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Single-Station Smoke Alarm," "Multiple-Station Smoke Alarm," "Single- and/or Multiple-Station Smoke Alarm," "Single- and/or Multiple-Station Smoke Alarm Accessory," "Single-Station Smoke Alarm and Household Burglar Alarm Unit," "Single- and/or Multiple-Station Smoke Alarm Accessory - Also Suitable for Use as a Household Burglar Warning System Control Unit," "Single- and/or Multiple-Station Smoke Alarm Accessory - Also Suitable as a Household Burglar Warning System Control Unit, Home Health Care Control Unit, and Signal Appliance Control Unit," "Single- and/or Multiple-Station Smoke Alarm Accessory - Also Suitable as a Household Burglar Warning System Control Unit Accessory, Personal Call Unit, and Signal Appliance Environment Transmitter," "Travel Smoke Alarm," "Single-Station Smoke Alarm - Also Suitable as a Travel Smoke Alarm," "Single-Station Smoke Alarm - Also Suitable for Use in Recreational Vehicles," "Single-Station Smoke Alarm - Also Suitable for Use in Recreational Vehicles and as a Travel Smoke Alarm," "Single-Station Smoke Alarm Accessory - Also Suitable for Use as a Household Burglar Alarm Unit."

Any of the preceding product names may include "For The Hearing Impaired" for products so identified in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

HEAT ACTUATED DEVICES FOR SPECIAL APPLICATION (UTHV)

General - Devices included under this category are fixed temperature heat actuated type detectors employing a special construction different from conventional thermostats and are designed to detect an abnormal increase in air temperature.

Installation - These detectors are intended to be installed adjacent to the equipment being protected in ordinary indoor locations in a manner

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acceptable to the local authority having jurisdiction and in accordance with NFPA Standard No. 72 or other NFPA Standard which may apply, such as for extinguishing system applications. The temperature rating of the detector shall be taken into consideration with regard to installation in the ambient temperature of the equipment to be protected under operating conditions to guard against false alarms. The detectors are intended to be connected to the initiating device circuits of Listed control units which provide audible alarm signals or employed as part of an extinguishing system. Authorities having jurisdiction should be consulted in all cases before installation.

Spacings For Equipment Protection - Reference should be made to the manufacturer's installation drawings and instructions. Spacings for smooth ceilings with large bays are included in the individual Listings. For open area protection see additional information under the Classification Thermostats Guide USCV.

The basic standard used to investigate products in this category is UL521, "Heat Detectors for Fire Protective Signaling Systems".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Heat Actuated Device For Special Application," "Control Unit for Special Application" and "Control Unit Accessory for Special Application".

HOUSEHOLD FIRE-WARNING SYSTEM UNITS (UTLQ)

SCOPE — This category covers the individual units which are interconnected to form an electrically operated household fire-warning system. These units include a main control unit (with integral or separate power supply) and related accessories intended for connection to the control unit. Refer to the applicable General Information Sections for a description of the units covered.

Additional equipment and materials such as bells, horns, heat detectors, smoke detectors, and limited energy fire detector circuit wiring may be required in various applications to complete a system. Separate listings of such equipment can be found in the following categories in this Directory: Audible Signal Appliances (ULSZ); Smoke—Automatic Fire Detectors (UROX); Heat—Automatic Fire Detectors (UQGS); Fire Alarm Devices, Single and Multiple Station (UTER); see also Wires, Miscellaneous (ZMHX) in the Electrical Construction Equipment Directory.

INSTALLATION — The units comprising a system are intended to be installed in accordance with the applicable requirements of Chapter 2 of the National Fire Protection Association Standard for National Fire Alarm Code (NFPA No. 72). Authorities Having Jurisdiction, such as the local fire authority, shall be notified of the installation.

AT LEAST ONE SMOKE DETECTOR IS REQUIRED TO BE PROVIDED IN A HOUSEHOLD FIRE-WARNING SYSTEM. The smoke detector can be either electrically wired to and operated from the control unit, or be a separately operated device such as an electrically operated single-station fire alarm device.

An installation drawing and/or detailed instructions are employed as the controlling factor to assure proper installation and interconnection among units. This material may be attached to the control unit, provided detached, or included as part of an instruction booklet.

INSTRUCTIONS — An instruction booklet illustrating typical install layouts, operation, maintenance, servicing, and test procedures is supplied with the main control unit. Printed information for a household emergency evacuation plan may be separate or included as part of the booklet.

The basic standard used to investigate products in this category is UL 985, "Household Fire Warning System Units."

Control Units and Accessories, Household System Type (UTOU)

This category covers control units and accessories intended to be used as part of a household fire-warning system.

Control Unit — Consists of a unit assembly of electrical parts having provision for connection of power supply, signal actuating devices (thermostats, smoke detectors, switches, etc.), and signal indicating devices (bells, horns, etc.).

Combination Control Unit — A control unit may additionally include circuit facilities for connection to burglar alarm devices to form a combination fire-burglar control unit. In such a combination unit the fire alarm signal takes precedence over the burglar alarm signal and a distinction between alarm signals is required. A common trouble signal may be employed for both.

Modular Control or Combination Unit — A control unit may be pre-wired at the factory or assembled from readily installed modules. A listed burglary module can be added after the unit is installed to expand the system capability. The installation diagram indicates the type and number of modules that can be employed in a control unit.

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Where model numbers are indicated in the Listings, 100 percent of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100 percent of production.

This category also covers household fire warning system units which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt household fire warning system units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt household fire warning system units meet the current UL requirements.

ADDITIONAL INFORMATION

For additional information, see Household Fire-warning System Units (UTLQ), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 985, "Household Fire-warning System Units."

ADJUNCT SERVICES

Underwriters Laboratories Inc. provides a service for Classification of control units and accessories for use in household fire-warning systems that not only meet the requirements of UL 985 but also have been investigated in accordance with ANSI/SIA CP-01-2000, "Control Panel Standard – Features for False Alarm Reduction."

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The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Household Fire Warning System Control Unit," "Household Fire and Burglary Warning System Control Unit for Use with Listed Modules," "Household Fire Warning System Module," "Household Fire and Burglary Warning System Control Unit," "Household Fire and Burglary Warning System Control Unit Assembly," "Household Fire Warning System Control Unit for Use with Listed Modules," "Household Fire Warning System Module," "Household Fire Warning System Control Unit Accessory," "Household Fire and Burglary Warning System Control Unit Accessory," "Household Signal System Enclosure," "Signaling Device" or "Household Fire and Burglary Warning System Control Unit Accessory."

The Listing Mark for rebuilt household fire warning system units includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the above product name.

Products that have also been investigated in accordance with ANSI/SIA CP-01-2000, "Control Panel Standard – Features for False Alarm Reduction" are marked, in combination with the Listing Mark, "Also Classified IN ACCORDANCE WITH ANSI/SIA CP-01-2000."

2003 General Information for Selected Categories from the Fire Resistance Directory

PART VI

Fire Resistance Ratings (BXRH)

I. GENERAL

This directory consists of three volumes:

Volume 1 includes hourly ratings for fire resistance rated assemblies, such as beams, floors, roofs, columns, and walls and partitions. These fire resistance designs provide the detailed construction of the assemblies and the components used.

Volume 2 includes hourly ratings for fire resistance rated systems, such as construction joint systems, through-penetration fire-stop systems, electrical circuit protective systems and duct assemblies. These designs provide the detailed construction of the systems and the components used.

Volume 3 includes hourly ratings for opening protectives, such as dampers, fire doors, glazing and related equipment. Opening protectives are used to protect openings in fire resistance rated assemblies.

Materials covered in this directory are intended for use only in specific assembly or system designs as described in the general Guide Information for each product category and individual Listings, except for opening protectives. Opening protectives have been evaluated for use as described in the instructions and markings provided with the opening protectives. The use of the materials and opening protectives in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been evaluated by UL.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Building materials evaluated with regard to surface burning characteristics such as flame spread and smoke developed during fire exposure, as well as building materials used for means of egress and roof vents are covered in UL's Building Materials Directory.

Electrical equipment and appliances, other than those described in this directory, are covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory. Electrical equipment intended for use in hazardous (classified) locations is covered in UL's Hazardous Locations Equipment Directory.

Equipment intended for fire protection purposes, including fire suppression equipment, fire alarm equipment, and fire services equipment is covered in UL's Fire Protection Equipment Directory.

Equipment for use aboard marine vessels or in a marine environment is covered in UL's Marine Products Directory.

Roof covering materials intended for protection of roof decks from external fire exposure, and roof deck assemblies intended for performance under internal fire exposure are covered in UL's Roofing Materials and Systems Directory.

III. EVALUATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

IV. INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are evaluated for the specifications or use conditions indicated in the general Guide Information for each product category.

The products covered in this directory are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

V. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VI. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VII. TECHNICAL SERVICE

Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.

Design Modifications

Careful consideration needs to be given to alterations or modifications of the fire resistance assemblies.

When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.

Contacting UL

UL provides assistance to users of fire resistance assemblies and products which includes clarification of the published information.

UL also provides a service to evaluate modifications to the fire resistance assemblies when requested by the design submitter or by an end user. Requests for clarification should describe the change and include drawings, if necessary.

Requests for clarifications or evaluations can be made by contacting UL at:

Phone:	+1 877 ULHELPS (1-877-854-3577)
Fax:	+1 847-574-4005
E-mail:	nbk.customerservice.fp@us.ul.com
or	
UL's website:	www.ul.com

LUMINAIRES CLASSIFIED FOR FIRE RESISTANCE (CDHW)

This category covers luminaires for recessed installation in ceilings in accordance with the provisions of the National Electrical Code, NFPA 70. They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

These luminaires have been investigated and found to comply with applicable electrical requirements and are so labeled.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above

the UL symbol (as illustrated in the Introduction of this Directory), the product identity "Luminaires Classified for Fire Resistance," "Fire Resistance Classification" and "See UL Fire Resistance Directory," and a control number.

SPEAKER ASSEMBLIES FOR FIRE RESISTANCE (CHML)

USE AND INSTALLATION

This category covers speaker assemblies that have been investigated for installation in ceilings of fire resistive floor-ceiling and roof-ceiling assemblies. They have been shown to provide a degree of fire resistance when installed in the specific designs described for each Classified company.

The speaker assemblies have been investigated for use in specific ceilings with respect to: (1) maximum size of the individual speaker assem-

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blies, (2) minimum spacing between individual speakers and (3) maximum aggregate area of the speaker assemblies per 100 sq ft of ceiling area.

Speaker assemblies are intended to be installed in accordance with the installation instructions supplied with the product and as described in the individual fire resistive designs.

Some of these speaker assemblies are provided with an outer enclosure. The insulation material that surrounds the enclosure that is exposed to the airflow in a return air plenum space has also been evaluated to ANSI/UL 723, "Test for Surface Burning Characteristics of Building Materials." These materials have a flame spread value of 25 or less and a smoke developed value of 50 or less.

RELATED PRODUCTS

Speakers for use in non-hourly fire rated ceiling systems and rated for plenum use are covered under Speakers and Amplifiers for Fire Protective Signaling Systems (UUMW) in the Fire Protection Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), the product identity "SPEAKER ASSEMBLY FOR FIRE RESISTANCE" and a control number.

WALL OPENING PROTECTIVE MATERIALS (CLIV)

USE AND INSTALLATION

This category covers proprietary compositions which are used to maintain the hourly ratings of fire resistive walls and partitions containing flush mounted devices such as outlet boxes, electrical cabinets and mechanical cabinets.

The General Design Information Section of the UL Fire Resistance Directory, Walls and Partitions, Metallic Electrical Outlet Boxes specifies the conditions under which Listed metallic outlet and switch boxes may be installed within fire resistance rated wall assemblies constructed with bearing and nonbearing wood or steel studs and gypsum board facings. In addition, the category Nonmetallic Outlet Boxes and Fittings Classified for Fire Resistance (CEYY) includes Classifications for nonmetallic outlet boxes along with the conditions under which such outlet and switch boxes may be installed within fire resistive wall assemblies. With either type of outlet or switch box, it may be possible to install the boxes under less stringent conditions when such boxes are used in conjunction with wall opening protective materials. Use of wall opening protective materials may allow for (1) reducing the spacing between boxes contained on opposite sides of the wall, (2) increasing the size of the boxes, (3) increasing the density of boxes installed, and/or (4) allowing the use of boxes on each side of staggered stud walls. The individual Classifications within this category indicate the specific applications and the method of installation for which the materials have been evaluated.

Electrical devices are intended to be installed in accordance with the provisions of NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**WALL OPENING PROTECTIVE MATERIAL
FIRE RESISTANCE CLASSIFICATION
SEE PRODUCT CATEGORY
IN UL FIRE RESISTANCE DIRECTORY
Control No.**

ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS (FHIT)

GENERAL

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This category covers electrical circuit protective systems consisting of components and materials intended for installation as protection for specific electrical wiring systems, with respect to the disruption of electrical circuit integrity upon exterior fire exposure. The specifications for the protective system and its assembly are important details in the development of the ratings. Information concerning these details are described on the individual systems. System components identified by an (*) in the description text are Classified under the Classification and Follow-Up Service of Underwriters Laboratories Inc. Such components and names of manufacturers who are authorized to apply the Classification Mark are identified under the specific product category.

These protective systems are evaluated with respect to fire exposure and water hose stream performance. Systems incorporating cable protected with electrical circuit protective materials are evaluated to Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems." Systems constructed with fire resistive cable are evaluated to UL 2196, "Tests of Fire Resistive Cables."

Ratings apply only to the entire protective system assembly. Individual components and materials are designated for use in a specific system(s) for which corresponding ratings have been developed, and are not intended to be interchanged between systems. Ratings are not assigned to individual system components or materials.

Where indicated in the system, the ampacity reduction due to the electrical circuit protection system has been determined for normal ambient temperature operating conditions in accordance with IEEE P848-96, "Procedure for the Determination of Ampacity Derating of Fire Protected Cables." If not specified in the individual system, the effect of the electrical circuit protection system on the ampacity of the electrical conductors has not been investigated.

Classification of these protective systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

The products used in these systems are to be installed in accordance with the applicable accompanying instructions. Authorities Having Jurisdiction should be consulted as to the specific requirements covering the installation and use of these Classified systems.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

Electrical Circuit Protective Materials (FHIY)

Electrical circuit protective materials are of proprietary composition and are intended for installation in accordance with the application instructions provided with the product, and as specified on the design card for an individual electrical circuit protective system. Properties of these materials, other than the degree of fire resistance provided to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate the electrical circuit protective systems in which these products are installed is Subject 1724, "Outline of Investigation for Fire Tests of Electrical Circuit Protective Systems."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**ELECTRICAL CIRCUIT PROTECTIVE MATERIALS
FOR USE IN ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS
SYSTEM NO.
SEE UL BUILDING MATERIALS DIRECTORY
(Control No.)**

Fire Resistive Cable (FHJR)

USE AND INSTALLATION

This category covers fire resistive cable which is insulated electrical cable intended for installation as specified in the individual electrical circuit protective systems. This cable has been investigated for its ability to remain electrically functional during a fire exposure and after the impact, erosion and cooling effect of a water hose stream test.

The cable as used in the specified systems has been investigated and found to comply with applicable electrical requirements and is so Listed in UL's Electrical Construction Equipment Directory.

This cable is intended to be installed in accordance with the provisions of NFPA 70, "National Electrical Code."

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Circuit Protective Systems (FHIT) and Fire Resistance Ratings (BXRH).

REQUIREMENTS

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The basic standard used to investigate the electrical circuit protective systems in which these products are installed is UL 2196, "Tests for Fire Resistive Cables."

Data concerning the insulation resistance and leakage current performance of the electrical cables during tests conducted in accordance with UL 2196 are contained in the test report. Test reports are available from the Classified company.

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FIRE RESISTIVE CABLE
FOR USE IN ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS
SYSTEM NO. _____
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

THERMAL BARRIER SYSTEMS (XCLF)

Thermal barrier systems consist of components and materials that are intended for installation as protection for electrical wiring systems specified in the individual system designs with respect to heat transmission from exterior fire exposure. The specifications for the thermal barrier systems and their assembly are important details in the development of the ratings. Information concerning these details are described in the individual systems. System components identified with an (*) in the description text are Classified under the Classification and Follow-Up Service Program of Underwriters Laboratories Inc. Such components and names of manufacturers who are authorized to apply the Classification Marking, are identified under the specific product category.

These thermal barrier systems are evaluated by the fire exposure test as described in the Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components, ASTM E 1725-95.

Ratings apply only to the entire thermal barrier system. Individual components and materials are designed for use in a specific system(s) for which corresponding ratings have been developed and are not to be interchanged between systems. Ratings are not assigned to individual system components or materials.

When indicated in the system, the ampacity reduction due to the thermal barrier system has been determined for normal ambient temperature conditions in accordance with the "Procedure for the Determination of the Ampacity Derating of Fire Protected Cables", IEEE P848-96. If not specified in the individual system, the effect of the barrier system on the ampacity of the electrical conductors has not been investigated.

Classification of these thermal barrier systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

The products used in these systems are to be installed in accordance with the applicable accompanying instructions. Authorities having jurisdiction should be consulted in all cases as to the specific requirements covering the installation and use of these Classified systems.

Batts and Blankets (XCLR)

This category covers insulating batts and blankets used to wrap electrical wiring systems in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E 1725-95, "Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**BATTS AND BLANKETS
FOR USE IN THERMAL BARRIER SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

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Packing Materials (XCMD)

Packing materials are of proprietary composition and are intended for installation in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E 1725-95, "Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**PACKING MATERIALS
FOR USE IN THERMAL BARRIER SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

Preformed Mineral and Fiber Units (XCMK)

This category covers preformed mineral and fiber units used to protect electrical wiring systems in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E 1725-95, "Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**PREFORMED MINERAL AND FIBER UNITS
FOR USE IN THERMAL BARRIER SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

THROUGH-PENETRATION FIRESTOP SYSTEMS (XHEZ)

GENERAL

A firestop system is a specific construction consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire through the openings. The specifications for materials in a firestop system and the assembly of the materials are details that directly relate to the established ratings. Information concerning these details is described in the individual systems. The hourly ratings apply only to the complete systems. Individual components are designated for use in a specific system to achieve specified ratings. The individual components are not assigned ratings and are not intended to be interchanged between systems. Additionally, the substitution or elimination of components required in a system should not be made unless specifically permitted in the individual system or in these general guidelines.

The basic standard used to investigate products in this category is ANSI/UL 1479 (ASTM E814-02), "Fire Tests of Through-Penetration Firestops." The Standard requires a positive furnace pressure differential of at least 0.01 in. of water that shall be maintained at a distance of 12 in. below horizontal test assemblies and 0.78 in. below the fill materials surrounding the penetrating items passing through vertical test assemblies. The Classifications of firestop systems contemplate installation in heated and air conditioned environments unless stated otherwise in the description of the system.

ANSI/UL 1479 defines the criteria for hourly F, T and L ratings for firestop systems. The F rating criteria prohibits flame passage through the system and requires acceptable hose stream test performance. The T rating criteria prohibits flame passage through the system and requires the maximum temperature rise on the unexposed surface of the wall or floor

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assembly, on the penetrating item and on the fill material not to exceed 325°F (181°C) above ambient, and requires acceptable hose stream test performance.

The L rating criteria determines the amount of air leakage, in cu feet per minute per square foot of opening (CFM/sq ft), through the firestop system at ambient and/or 400°F air temperatures at an air pressure differential of 0.30 in. W.C. The L ratings are intended to assist Authorities Having Jurisdiction, and others, in determining the suitability of firestop systems for the protection of penetrations and miscellaneous openings in floors and smoke barriers for the purpose of restricting the movement of smoke in accordance with NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures."

Materials used in the firestop systems are to be installed in accordance with the manufacturer's instructions provided with the materials. The structural integrity of the floor or wall assembly needs to be evaluated when providing openings for the penetrating items.

NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilation Systems," contains requirements on the use of fire dampers in conjunction with ventilation ducts. Unless specifically indicated as part of the Classification of the damper, the annular space around the damper sleeve shall not be firestopped with the materials described herein.

The systems covered in this category are Classified with respect to (1) installation in a wall only, (2) installation in a floor only or (3) installation in either a wall or a floor. Unless otherwise indicated in the systems, the ratings for firestop systems installed in walls apply when either face of the wall is exposed to fire. The ratings for firestop systems installed in a floor apply when the underside or ceiling surface is exposed to fire.

The hourly fire endurance rating of the walls and floors incorporating these systems are not indicated. Volume 1 of the Fire Resistance Directory covers the hourly fire endurance ratings of floor and wall assemblies. Firestop systems that specify installation in concrete floors may include installation in floors consisting of fluted or corrugated steel deck topped with structural concrete, provided that (1) the concrete topping thickness measured above the top plane of the steel deck is equal to our greater than the minimum concrete thickness specified in the system, and (2) the firestop system does not require any portion of the forming material or fill material to extend below the bottom plane of the floor.

Some firestop systems specify the use of hollow-core **precast concrete unit** floor assemblies. Where not specified, firestop systems utilizing caulk, sealant, putty or spray materials installed over a mineral wool or ceramic blanket may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, (2) the maximum size of the opening is 7 in. diameter or 7 in. by 7 in., and (3) any cores of the precast concrete units penetrated as a result of the firestop system are sealed with a minimum 4 in. depth of either firmly packed minimum 4 pcf mineral wool or ceramic fiber blanket, or concrete, grout or mortar. Additionally, firestop systems utilizing a firestop device or wrap strips/steel collar installed around the penetrant beneath the floor may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, and (2) the maximum size of the opening is 7 in. diameter or 7 in. by 7 in.

NFPA 70, "National Electrical Code" (NEC) contains requirements for permissible installation and percentages of electrical conductor fill for conduits, cable trays and other electrical conductor raceways.

Authorities Having Jurisdiction should be consulted as to the particular requirements covering the installation and use of these Classified systems. Those materials identified by an (*) in the system description text are eligible to be produced under the Follow-Up Service Program of Underwriters Laboratories Inc. The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

PENETRATING ITEMS

When the penetrating item is indicated as being conduit, the conduit is intended for use as a raceway for electrical conductors in accordance with the NEC. Electrical conductors may be used without conduit only when permitted by and installed in accordance with the NEC, and when the conductors are specifically described in the firestop system. The maximum conductor size and the maximum number of conductors in the individual cables are specified in each system. All electrical conductors are to be copper unless indicated otherwise in the system.

When the penetrating item is indicated as being pipe, the pipe is intended for the transport of gases, liquids and the like. The maximum diameter, the minimum wall thickness and the specific material for conduit and pipes are specified in each system. All nonmetallic pipes are to be of the solid core type unless indicated otherwise in the system.

Further specifications for the various types of penetrating items may be found in the documents tabulated below:

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Penetrating Item	Document
Electrical Metallic Tubing (EMT)	UL 797
Intermediate Metal Conduit (IMC)	UL 1242
Rigid Metal Conduit	UL 6
Copper Tubing	ASTM B88
Copper Pipe	ASTM B42
Flexible Metal Conduit	UL 1
Liquid Tight Flexible Nonmetallic Conduit	UL 1660
Rigid Nonmetallic PVC Conduit	UL 651
Electrical Nonmetallic Tubing (ENT)	UL 1653
Cross-linked Polyethylene (PEX) Tubing	ASTM D2737
Solid Core Polyvinyl Chloride (PVC) Pipe	ASTM D1785 and D2665
Cellular Core Polyvinyl Chloride (PVC) Pipe	ASTM F891
Chlorinated Polyvinyl Chloride (CPVC)	ASTM F442
Solid Core Acrylonitrile Butadiene Styrene (ABS) Pipe	ASTM D1527 and D2661
Cellular Core Acrylonitrile Butadiene Styrene (ABS) Pipe	ASTM F628
Polybutylene (PB) Pipe	ASTM D3000
Polyvinylidene Fluoride (PVDF) Pipe	ASTM F1673
Fiberglass Pipe	ASTM D2997

Where the individual system specifies the penetrating item is to be rigidly supported on both sides of wall or floor, the support system should be designed based upon the premise the firestop system provides no support.

Where the penetrating item is indicated as a metallic pipe, conduit, tube, duct or cable, and the firestop system consists of a fill material (such as sealants, putty or mortar) and a packing material, the penetrant may pass through the opening in the wall or floor assembly at an angle, provided the annular space is maintained on both sides of the wall or floor assembly. In all other cases, except where otherwise indicated in the system, the penetrating item shall penetrate the wall or floor assembly at a 90° angle.

Some systems do not include penetrating items. These firestop systems are intended to be used to seal openings where the penetrating items have been removed or where the penetrating items have not yet been installed.

FORMING MATERIALS

Forming materials specified for a firestop system are not to be removed after cure of the fill material, unless removal is specified in the description of the system.

FILL MATERIALS

When more than one fill, void or cavity material is specified under a single item number within a firestop system, it is intended that any single one of the materials may be used.

CONDUCTOR AMPACITY

Where indicated in the system, the ampacity reduction due to the firestop system has been determined in accordance with Subject 1712, "Outline of Investigation for Tests for Ampacity of Insulated Electrical Conductors Installed in Fire Protective Systems." If not specified in the individual system, the effect of the firestop system on the ampacity of electrical conductors has not been investigated.

NUMBERING SYSTEM

The systems are identified in this category by an alpha-numeric identification system. The alpha components identify the type of assembly being penetrated and the numeric component identifies the type of penetrating item.

The first alpha component is either an F, W or C. The F signifies a floor is being penetrated, the W signifies a wall is being penetrated, and C signifies either a floor or a wall is being penetrated.

The second alpha component may be any letter. The significance of the letter used is:

Letter	Description
A	Concrete floors with a minimum thickness less than or equal to 5 in.
B	Concrete floors with a minimum thickness greater than 5 in.
C	Framed floors
D	Steel decks in marine vessels
E	Floor-ceiling assemblies consisting of concrete with membrane protection
F through I	Not used at present time
J	Concrete or masonry walls with a minimum thickness less than or equal to 8 in.
K	Concrete or masonry walls with a minimum thickness greater than 8 in.
L	Framed walls
M	Bulkheads in marine vessels

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Letter	Description
N	Composite panel walls
O through Z	Not used at present time

The numeric component uses sequential numbers to identify the penetrating item. The significance of the number used is:

No. Range	Description
0000-0999	No penetrating items
1000-1999	Metallic pipe, conduit or tubing
2000-2999	Nonmetallic pipe, conduit or tubing
3000-3999	Electrical cables
4000-4999	Cable trays with electrical cables
5000-5999	Insulated pipes
6000-6999	Miscellaneous electrical penetrants such as busducts
7000-7999	Miscellaneous mechanical penetrants such as air ducts
8000-8999	Groupings of penetrations including any combination of items listed above
9000-9999	Not used at present time

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

FILL, VOID OR CAVITY MATERIALS (XHHW)

GENERAL

This category covers fill, void or cavity materials that are proprietary materials installed at the job site in accordance with the application instructions provided with the product and with the instructions specified in the individual joint system, perimeter fire containment system or through-penetration firestop system. Except as specified below, properties of the fill, void or cavity materials other than the capacity to provide a degree of fire resistance to openings provided in fire resistive walls or floors have not been investigated.

In addition to Classification for use in joint systems, perimeter fire containment systems or through-penetration firestop systems, where indicated in the individual Classifications, fill, void or cavity materials have also been investigated in accordance with ASTM E136-99e1, "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C."

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate the systems in which these products are installed are ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops," an assimilation of the methods and conditions of acceptance contained in NFPA 285, "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus" (1998 edition) and ANSI/UL 2079, "Tests for Fire Resistance of Building Joint Systems."

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

For fill, void or cavity materials investigated for use in through-penetration firestop systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

For fill, void or cavity materials investigated for use in joint systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

For fill, void or cavity materials investigated for use in perimeter fire containment systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

**2003 GENERAL INFORMATION FOR
SELECTED CATEGORIES FROM THE
FIRE RESISTANCE DIRECTORY**

For fill, void or cavity materials investigated for use in firestop systems, joint systems and/or fire containment systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS AND/OR
JOINT SYSTEMS AND/OR PERIMETER FIRE CONTAINMENT
SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

+ – Where applicable, the following statement may be added to any of the Classification Marks shown above:

**FILL, VOID OR CAVITY MATERIAL
ALSO CLASSIFIED IN ACCORDANCE WITH ASTM E136-99e1
STANDARD TEST METHOD FOR BEHAVIOR OF MATERIALS
IN A VERTICAL TUBE FURNACE AT 750°C**

FIRESTOP DEVICES (XHJI)

Firestop devices consist of factory-built products intended to provide a degree of fire resistance to openings in fire resistive walls or floors to accommodate penetrating items such as electrical cables, cable trays, conduits and pipes.

Properties of the firestop devices that provide a degree of fire resistance to openings in fire resistive walls or floors have been investigated. Some Classifications include the effect the firestop device has on the ampacity rating of electrical conductors.

INSTALLATION

Firestop devices should be installed in accordance with the instructions provided with the device and described in this Directory. Classification of these firestop devices contemplates installation within a heated and air conditioned environment, unless stated otherwise in the individual Classifications.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**FIRESTOP DEVICE
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

FORMING MATERIALS (XH KU)

This category covers forming materials manufactured from proprietary materials, processed into the form of boards or sheets and formed into various sizes and shapes.

Properties of the forming materials other than the capacity to provide a degree of the fire resistance to openings provided in fire resistive walls or floors have not been investigated.

INSTALLATION

These materials are used as a form and seal to prevent leakage during the installation and curing of some fill, void or cavity materials and should be installed in accordance with the instructions specified in the individual joint system, perimeter fire containment system or through-penetration firestop system. After installation, forming materials are left in place and together with the fill material provide a degree of fire resistance for the opening.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS

The basic standards used to investigate the systems in which these products are installed are ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops," an assimilation of the methods and conditions of acceptance contained in NFPA 285, "Test for Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus" (1998 edition) and ANSI/UL 2079, "Tests for Fire Resistance of Building Joint Systems."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

**2003 GENERAL INFORMATION FOR
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FIRE RESISTANCE DIRECTORY**

For forming materials investigated for use in through-penetration firestop systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

For forming materials investigated for use in joint systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**FORMING MATERIAL
FOR USE IN JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

For forming materials investigated for use in perimeter fire containment systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**FORMING MATERIAL
FOR USE IN PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

For forming materials investigated for use in firestop systems, joint systems and/or fire containment systems, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

**FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS AND/OR
JOINT SYSTEMS AND/OR PERIMETER FIRE CONTAINMENT
SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)**

**THROUGH-PENETRATING
PRODUCTS (XHLY)
USE AND INSTALLATION**

**2003 GENERAL INFORMATION FOR
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FIRE RESISTANCE DIRECTORY**

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This category covers through-penetrating products that are proprietary products (cable, conduit, pipe and tubing) whose fire resistive properties have been investigated for specific applications in which they pass through openings in fire rated walls or floors, or both, within a building.

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Through-penetrating products and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual Classifications.

Where indicated in the individual Classifications, products have also been investigated to determine their suitability for exposure to ultraviolet light in accordance with UL 746C, "Polymeric Materials – Use in Electrical Equipment Evaluations."

Unless otherwise specified, properties of the through-penetrating products other than their capacity to provide a degree of fire resistance to openings in fire rated walls or floors have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops."

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**THROUGH-PENETRATING PRODUCTS
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

2003 General Information for Selected Categories from the Building Materials Directory

PART VII

Building Materials (AABM)

I. GENERAL

This directory includes building construction materials such as adhesives, coatings, acoustical materials, and siding evaluated for surface burning characteristics such as flame spread and smoke developed during fire exposure. This directory also includes building materials evaluated for sound absorption properties, prefabricated buildings, structural building products, gypsum board, fireplaces and chimneys, elevator equipment, and exiting equipment such as exit signs, exit appliances, and emergency lighting and power equipment.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Electrical equipment and appliances, other than those described in this directory, are covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory. Electrical equipment intended for use in hazardous (classified) locations is covered in UL's Hazardous Locations Equipment Directory.

Equipment intended for fire protection purposes, including fire suppression equipment, fire alarm equipment, and fire services equipment is covered in UL's Fire Protection Equipment Directory.

Fire resistance rated assemblies, including fire resistant walls, columns, roofs, fire doors, windows, dampers, and through-penetration fire-stop systems used to protect openings in fire rated assemblies are covered in UL's Fire Resistance Directory.

Equipment used in heating, cooling, refrigerating, ventilating and cooking applications, as well as accessories associated with such equipment are covered in UL's Heating, Cooling, Ventilating and Cooking Equipment Directory.

Plumbing system appliances, fixtures, fittings and piping are covered in UL's Plumbing and Associated Products Directory.

Roof covering materials intended for protection of roof decks from external fire exposure, and roof deck assemblies intended for performance under internal fire exposure are covered in UL's Roofing Materials and Systems Directory.

III. EVALUATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

IV. INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are evaluated for the specifications or use conditions indicated in the general Guide Information for each product category.

The products covered in this directory are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

V. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VI. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

PREFABRICATED BUILDINGS (QRAR)

These are factory-built buildings, structures, and building assemblies incorporating pre-installed materials and equipment which, after installation, are usually concealed and may not be accessible for inspection at the installation site.

They are intended for installation subject to approval by the Authority Having Jurisdiction.

The buildings, structures, and building assemblies have been investigated in accordance with one or more Model Codes (such as Building, Fire, Plumbing, Mechanical, Gas, Energy) and the National Electrical Code and/or a State Code and/or an applicable Building Code of the local jurisdiction. As an alternate, the building, structure, and building assemblies have been investigated in accordance with one or more specific areas of a code such as electrical, plumbing, mechanical, structural, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used.

PREFABRICATED UNITS (QRHQ)

Prefabricated units are factory built assemblies for varying uses such as rooms within buildings or rooms within rooms of buildings for commercial, industrial or residential use, outdoor or exterior roofed structures, and canopies.

These prefabricated units are intended for installation subject to approval by the Authority Having Jurisdiction.

These units have been investigated in accordance with the applicable sections of one or more Model Codes (such as Building, Fire, Plumbing, Mechanical, Gas, Energy), the National Electrical Code, a State Code or an applicable Code of the local jurisdiction. As an alternate, the units may have been investigated in accordance with only one or more specific areas such as electrical, plumbing, mechanical, etc.

When the building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, flame spread, etc., the applicable requirements of the National Fire Codes are used.

For additional information, see Prefabricated Buildings (QRAR).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify prefabricated units produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "PREFABRICATED UNIT IN ACCORDANCE WITH" (Building Code, National Electrical Code, etc.).

The Classification Marking includes reference to the specific codes (including editions) to which the product was investigated. One Classification Marking is applied to each prefabricated unit at a location visible after the unit is erected. In addition, a manufacturer's data plate is applied adjacent to the UL Mark, where necessary to convey applicable information such as the equipment and appliances factory furnished as part of the classified unit, the structural design loads, and any site-completed items subject to review by the local regulatory authority. If the unit is shipped knocked down, the number and description of the sections required to complete the unit is included on the data plate.

COMMERCIAL AND INDUSTRIAL BUILDINGS (QRNZ)

This category includes automotive service station buildings, food stands, toll booths, motel units, and similar prefabricated buildings.

Automotive service station buildings employ building materials having flame spread rating of 25 or less for interior and exterior surfaces.

These modular buildings have been classified in accordance with one or more model (Building) codes and the National Electrical Code and/or a State Building Code and/or an applicable Building Code of the local jurisdiction.

As an alternate, the building has been classified in accordance with one or more specified areas of a Building Code such as electrical, plumbing, mechanical, structural, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used for classification purposes.

Prefabricated commercial and industrial buildings are intended for installation subject to approval by the authority having jurisdiction.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories, Inc. (shown below) on the product is the only method provided by Underwriters Laboratories, Inc. to identify Commercial Buildings produced under its Classification and Follow-Up Service.

"Commercial Building Classified by Underwriters Laboratories, Inc. in accordance with (Building Code, National Electrical Code, Etc.)."

One Classification Marking is applied to each building at a location visible after the building is erected. In addition, information covering the equipment and appliances factory furnished as part of the classified building and, if the building is shipped knock down, the number and description of the sections required to complete the building is included on a data plate.

COMPOSITE PANELS (QRSY)

Composite panels are factory-built assemblies for use in, within, or as part of the structure of buildings for commercial, industrial, and residential use.

These factory-built panels may incorporate pre-installed materials and equipment which after installation are concealed and which may not be accessible for inspection at the installation site.

These factory built panels are intended for installation subject to approval by the authority having jurisdiction.

These panels have been investigated in accordance with the applicable sections of one or more Model Building Code, Plumbing Code, the National Electrical Code, a State Building Code and/or an applicable Building Code of the local jurisdiction.

As an alternate the panels may have been investigated in accordance with only one or more specific areas of a code such as electrical, plumbing, mechanical, structural, etc.

Structural strength requirements vary with wind and snow conditions of each locality and stability is to a large measure dependent upon the attachment of the panels to field-erected foundations or structures. Local inspection authorities should be consulted with respect to their requirements for the methods to be employed to attach the panels.

Prefabricated Composite Panel

Prefabricated Office Divider Panels

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, flame spread, etc. the applicable requirements of the National Fire Codes are used.

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The flammability of building materials employed in panels is judged to be no greater than that of ordinary lumber used in site-constructed buildings or as shown on the Classified Marking.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classified Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify Composite Panels produced under its Classified and Follow-Up Service.

**COMPOSITE PANEL
CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH
(BUILDING CODE, NATIONAL ELECTRICAL CODE, ETC.)**

RESIDENTIAL BUILDINGS (QTDT)

This category includes single- and multi-family prefabricated modular buildings and building additions.

These modular buildings and building additions have been Classified in accordance with one or more Model (Building) Codes and the National Electrical Code and/or a State Building Code and/or an applicable Building Code of the local jurisdiction.

As an alternate, the building or building addition has been Classified in accordance with one or more specific areas of a Building Code such as electrical, plumbing, mechanical, structural, etc.

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SELECTED CATEGORIES FROM THE
BUILDING MATERIALS DIRECTORY**

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When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used for Classification purposes.

Residential buildings are intended for installation subject to approval by the authority having jurisdiction.

Residential building additions consisting of a group of wall, ceiling and floor panels and/or modules are intended to be site attached to an existing residence or Use Group R structure. The addition may contain or be designed to contain all or a portion of the minimum facilities (living, eating, sleeping etc.) of the applicable building codes for a residential occupancy. Attachment of the building to the existing structure and features of the final completed structure with addition such as minimum facilities, egress, area/height limitations, thermal envelope and others is subject to approval by the local authority having jurisdiction.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories, Inc. to identify Residential Buildings produced under its Classification and Follow-Up Service.

**(Residential Building) or (Residential Building Addition)
CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN
ACCORDANCE WITH
(Building Code, National Electrical Code, Etc.)**

2003 General Information for Selected Categories from the Heating, Cooling, Ventilating and Cooking Equipment Directory

PART VIII

Heating, Cooling, Ventilating and Cooking Equipment (AAHC)

I. GENERAL

This directory includes equipment intended for heating, cooling, refrigerating, ventilating and cooking, as well as associated accessories. The equipment covered in this directory uses various energy sources including electricity, gas, petroleum-base liquid, solid fuel or solar energy.

Fuel fired equipment covered in this directory is intended for use only with the fuels described in the general Guide Information for each product category and individual Listings. This equipment has been evaluated for use as described in the instructions and markings provided with the equipment. The use of the equipment with other fuels, and in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category, has not been evaluated by UL.

II. RELATED PRODUCTS

Products and equipment intended for use in Canada are covered in UL's Products Certified for Canada Directory.

Products and equipment certified in accordance with international and regional standards are covered in UL's Products Certified in Accordance with International and Regional Standards Directory.

Building materials evaluated with regard to surface burning characteristics such as flame spread and smoke developed during fire exposure, as well as building materials used for means of egress and roof vents are covered in UL's Building Materials Directory.

Electrical equipment and appliances, other than those described in this directory, are covered in UL's Electrical Appliance and Utilization Equipment Directory or UL's Electrical Construction Equipment Directory. Electrical equipment intended for use in hazardous (classified) locations is covered in UL's Hazardous Locations Equipment Directory.

Equipment intended for fire protection purposes, including fire suppression equipment, fire alarm equipment, and fire services equipment is covered in UL's Fire Protection Equipment Directory.

Fire resistance related assemblies, including fire resistant walls, columns, roofs, fire doors, windows, dampers, and through-penetration fire-stop systems used to protect openings in fire rated assemblies are covered in UL's Fire Resistance Directory.

Equipment used for the storing, containing, conveying, dispensing, regulating or use of flammable and combustible liquids and gases, and controls and detectors for the equipment in this directory are covered in UL's Flammable and Combustible Liquids and Gases Equipment Directory.

Equipment for use aboard marine vessels or in a marine environment is covered in UL's Marine Products Directory.

Plumbing system appliances, fixtures, fittings and piping are covered in UL's Plumbing and Associated Products Directory.

III. EVALUATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for evaluating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

IV. INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

In addition, certain products have been evaluated with reference to environmental and public health effects and for potential conformity to the installation and use provisions of applicable environmental and public health requirements, if so indicated in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are evaluated for the specifications or use conditions indicated in the general Guide Information for each product category.

The products covered in this directory are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

V. INSTRUCTIONS AND PRODUCT MARKINGS

The products included in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

VI. FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VII. INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

VIII. ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of NFPA 70, "National Electrical Code" (NEC) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

HEATING APPLIANCES (KTCR)

GENERAL

This category covers heating appliances intended for installation and use in accordance with NFPA 31, "Standard for the Installation of Oil-Burning Equipment," NFPA 54, "National Fuel Gas Code," NFPA 58, "Liquefied Petroleum Gas Code," NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems" and NFPA 90B, "Standard for the Installation of Warm Air Heating and Air-Conditioning Systems," as appropriate. When installing mobile home and recreational vehicle appliances, see also the Department of Housing and Urban Development's Manufactured Home Construction and Safety Standards or NFPA 1192, "Standard on Recreational Vehicles."

Heating appliances are investigated to determine the suitability of the construction and performance of the appliances as an assembly and of the fuel-burning apparatus, controls, electrical features and other parts furnished by the manufacturer as part of the listed assembly. It is also determined that combustible walls and surfaces adjacent to or in contact with the appliance will not attain unsafe temperatures when the appliance is installed and used as directed.

Heating appliances are marked to indicate minimum clearances in inches, type of flooring, when they may be installed in an alcove or closet, and the total free area of the required air openings into a closet. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

When the Listing Mark on an appliance designates the primary safety control to be used, such appliances are suitable for operation when a competent attendant may not be present provided the appliance is so equipped. The primary safety control is designated by the control group number in accordance with the plan and classification under Controls, Primary Safety (see MCCZ).

The safety control to be used with the appliance will be indicated by either stating the manufacturer's name and marking of the particular control or controls to be used, or by stating the group number of the control to be used. When the group number is specified, the burner shall be provided with one of the controls classified as "Interchangeable." When a control manufacturer's name is specified with the group number, only the controls of that manufacturer classified in that group should be used.

Some burners are provided with integral primary safety controls or integral antiflooding devices and, when such controls are provided, the Listing Mark will specify "Integral" with or without the group designation, in which case only the control included as part of the appliance by the manufacturer shall be used.

For convenience, the primary safety control manufacturers' names will be abbreviated by using the first letter of each word in their corporate name when necessary to refer to them in the individual Listings.

When the Listing Mark on an appliance includes the statement "For Operation Only In Presence of Competent Attendant," such appliances are not furnished with primary safety controls and are intended for operation only in the presence of a competent attendant.

The Listing Mark applied to an oil-burning appliance designates the ASTM D396 grade number of the fuel oil, or other fuel, for which the appliance is Listed.

If the appliance is also investigated in accordance with a standard other than a UL Standard, the marking on the appliance includes the designation of that standard.

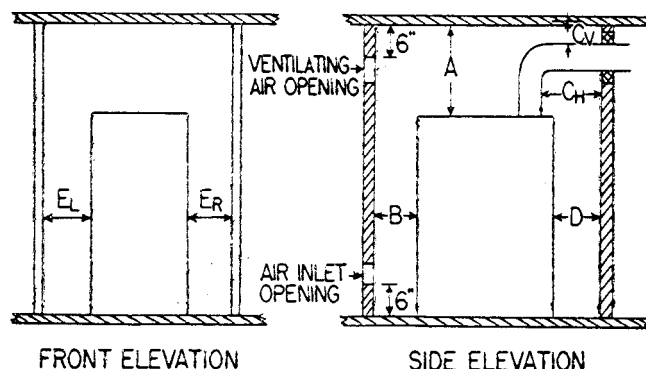
BOILER ASSEMBLIES (KVFT)

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction not less than indicated on the boiler assembly. They are provided with primary safety controls as indicated on the boiler assembly Listing Mark or on the burner Listing Mark and with limit controls.

On gas-fired, gas-oil-fired, and oil-fired boiler assemblies, the sketches, dimension symbols, and abbreviations as illustrated below are used in listings, published on 3X5 in. listing cards available from the Listee, to indicate minimum clearances in inches, kind of flooring, when an appliance may be installed in an alcove or closet, and the total free area of the

required air openings into a closet. This information is also marked on the appliance. The clearances so designated are the minimums required to avoid overheating; additional clearances may be needed for accessibility.

When a gas-fired, gas-oil-fired, or oil-fired boiler assembly is listed for typical installation clearances, the listing refers to the Form designation; but when the clearances are not typical, each clearance is indicated by the appropriate symbols in the listing. If a boiler assembly listed for alcove or closet installation is installed in a room which is large in relation to the size of the boiler assembly it may be installed at the minimum clearances specified for closet and alcoves or as indicated by the designated optional Form.



Description of dimension, symbols and abbreviations.

A — Clearance above top of boiler.

B — From front of boiler. Prefix "C" to numeral indicated suitability for closet or alcove installations; prefix "A," suitability for alcove installation but not for closet.

C_H — From chimney or vent connector measured horizontally or below pipe.

C_V — From chimney or vent connector measured vertically above pipe.

D — From back of boiler.

E_L — From left side of boiler.

E_R — From right side of boiler.

F — Indicates type of flooring; "NC" for noncombustible; "C" for combustible.

G — Total minimum free area in square inches of air openings into a closet.

Form designations for typical installation clearances for gas-fired, gas-oil-fired, and oil-fired boiler assemblies installed in rooms.

Form	A	B	C_H	C_V	D	E_L	E_R	F
II	6	24	18	18	6	6	6	NC
IIa	6	24	18	18	6	6	6	C
III	18	48	18	18	18	18	18	NC
IIIa	18	48	18	18	18	18	18	C
IV	48	96	36	36	36	36	36	NC
IVa	48	96	36	36	36	36	36	C
XII	6	18	6	6	6	6	6	NC
XIIa	6	18	6	6	6	6	6	C

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies listed for Forms II, IIa, III, and IIIa are low heat appliances, those listed for Forms IV and IVa are medium heat appliances, all of which are to be flue connected to suitable chimneys.

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies listed for Forms XII and XIIa and those listed for Form III and IIIa equipped with draft hoods, are low heat gas appliances suitable for venting to Type B vents for gas appliances.

Solid fuel-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connectors must be connected to a chimney suitable for use with residential type and building heating appliances which burn solid fuel.

Solid fuel-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler

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assembly. The chimney connectors must be connected to a chimney suitable for use with residential type and building heating appliances which burn solid fuel.

Waste-heat-recovery boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connector must be connected to a suitable chimney.

Field-erected Boiler Assemblies (KVQE)

INSTALLATION INSTRUCTIONS

This category covers gas-fired, oil-fired or gas-oil-fired boiler assemblies intended to be assembled in the field by qualified service personnel. By design, the boiler consists of factory built subassemblies or segments and furnished with appropriate controls and detailed instructions to accommodate assembly and installation with applicable Codes.

The boiler may be furnished either with an integral burner or intended for installation with a factory-built burner to accommodate the boiler as indicated in the individual Listings.

Authorities Having Jurisdiction should be consulted in regard to the inspection of field-erected boiler assemblies.

RELATED PRODUCTS

For additional information, see Boiler Assemblies (KVFT), Heating Appliances (KTCR) and Gas, Oil, Mechanical and Chemical Appliances (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2106, "Field Erected Boiler Assemblies."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names and information, as appropriate: (A) "Gas-Fired (Oil-Fired) (Gas-Oil-Fired) Field-Erected Boiler Assembly, for Use with Integral Primary Safety Control", (B) "Field-Erected Boiler Assembly, for Use Only with (Company Name) Labeled Gas (or Oil) (or Gas-Oil) Burner Models(s) _____, Maximum Input Gas _____ BTU Per Hour, (Oil-Gals. Per Hour). Refer to Burner Label for Control and Fuel Specifications."

A field-erected gas, oil, or gas-oil fired boiler assembly which includes the burner as an integral part of the front head assembly bears a Listing Mark with the product name and information similar to (A).

A field-erected boiler assembly designed for installation with a Listed burner bears a Listing Mark with the product names and information similar to (B) which covers the boiler only. The burner bears a separate Listing Mark as described for "Gas Burners," "Oil Burners" or "Gas-Oil Burners" in this Directory. The proper assemblies of boilers and burners to make unit assemblies are as specified on the boiler Listing Mark.

SANITATION, FOOD SERVICE EQUIPMENT (TSQS)

VENDING MACHINES FOR FOOD AND BEVERAGES (TSYA)

USE

This category covers food and beverage vending machines that dispense unit servings of food or beverages, in bulk or in packages, upon insertion of a coin, paper currency, token, card, key or by manual operation. These products are intended for commercial use.

RELATED PRODUCTS

For vending machines intended for commercial use that have been investigated in accordance with UL Safety Standards, see Vending Machines (YWXV) and Vending Machines, Refrigerated (SQMX) in the Electrical Appliance and Utilization Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/NSF 25, "Vending Machines for Food and Beverages."

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory), the text "ANSI/NSF 25," the product identity "Vending

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Machine for Food and Beverages" (or other appropriate product name as shown in the individual Classifications) and a control number. The EPH Mark includes, within a triangle, the UL symbol, the word "CLASSIFIED" above the UL symbol, and the letters "EPH" below the UL symbol.

For those products which are also Listed by Underwriters Laboratories Inc. under Vending Machines (YWXV) or Vending Machines, Refrigerated (SQMX), the marking includes the appropriate Listing Mark, the EPH Mark (as described above), and the text "ANSI/NSF 25" below the EPH Mark.

VENTILATING EQUIPMENT FOR COMMERCIAL COOKING APPLIANCES (YXLT)

Ventilating equipment includes Exhaust Hoods With or Without Exhaust Dampers, Power Ventilators for Restaurant Exhaust Appliances, Grease Ducts, Grease Duct Enclosures, and Hood and Duct Accessories intended for installation in ventilating systems serving commercial cooking equipment. This equipment is intended for installation in accordance with the National Fire Protection Association Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment, NFPA 96, or other recognized codes or standards as indicated for the individual product categories.

In addition, Recirculating Ductless Hoods for Use with Specified Commercial Cooking Appliances are also included in this Section.

EXHAUST HOODS WITH EXHAUST DAMPERS (YXZR)

Exhaust hoods with exhaust dampers are intended to be installed over commercial cooking equipment. These hoods are provided with fire actuated exhaust dampers. They have been investigated to determine that they are capable of preventing the exhaust duct gas temperatures from exceeding 375 F and the passage of flame into the exhaust duct under conditions simulating a fire in the cooking area under a hood. Electrical components, if provided, are investigated as part of the Listing of the hood assembly.

Exhaust hoods with exhaust dampers may be provided with manually or automatically operated cleaning or washing systems. These systems are not investigated for grease extraction efficiency. These systems are not investigated for their suitability as fire extinguishing system units for the protection of grease removal devices and hoods, unless specifically indicated in the individual Listing and product markings on the hood.

Exhaust Hoods with exhaust dampers may be provided with sprinklers or automatic spray nozzle assemblies for protection of unlimited length of grease duct in accordance with NFPA 13. If provided, it shall be indicated in the individual Listing and product markings on the hood. The sprinklers or automatic spray nozzle assemblies intended for the protection of grease ducts are intended to be installed in accordance with NFPA 13, Standard for the Installation of Sprinkler System.

These devices are intended for installation in accordance with the National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96 and the National Electrical Code, NFPA 70.

All exhaust hoods with exhaust dampers are marked relative to minimum exhaust air flow and maximum supply air flow directed into the hood and/or out the bottom (if provided). Air flow rates are established under draft free laboratory conditions. Greater exhaust and/or lesser supply air flow rates may be required for each specific installation to obtain complete vapor and smoke removal.

Exhaust hoods provided with integral installed sprinklers or automatic spray nozzle assemblies for the protection of unlimited length of grease ducts are marked "Supplied With Factory Installed (Sprinklers) (Spray Nozzles) for the protection of unlimited length of Grease Duct having a maximum duct (diameter) (perimeter) of (inches) (feet). Connect to NFPA 13 sprinkler system water supply only".

Authorities having jurisdiction should be consulted before installation.

The basic standard used to investigate products in this category is UL710, "Exhaust Hoods For Commercial Cooking Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: (A) "Exhaust Hood With Exhaust Damper", (B) "Hood Assembly For Exhaust Hood With Exhaust Damper For Use Only With (Company Name) Labeled Sub-Assembly For Exhaust Hood With Exhaust Damper Part No. 1", (C) "Sub-Assembly For Exhaust Hood With Exhaust Damper, Part No. For Use Only With (Company Name) Labeled Hood Assembly For Exhaust Hood With Exhaust Damper".

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"Exhaust Hoods With Exhaust Dampers" that are complete in one factory-built assembly bear a Listing Mark with a product name similar to (A).

"Exhaust Hoods With Exhaust Dampers" that consist of a hood assembly and one or more sub-assemblies have a Listing Mark with the product name Shown in (B) on the hood assembly and a Listing Mark with the product name Shown in (C) on each sub-assembly.

POWER VENTILATORS FOR RESTAURANT EXHAUST APPLIANCES (YZHW)

GENERAL

This category covers power roof- and wall-mounted ventilators and proximity type ventilators consisting of an impeller and motor in a housing. Roof- and wall-mounted ventilators have a weather resistant housing and are supported by a weather resistant steel base designed to fit, usually by means of a steel curb, over a roof or wall exhaust duct opening for venting restaurant cooking appliances.

These ventilators are designed for the removal of smoke and grease-laden vapors at an exhaust air temperature not exceeding the maximum temperature shown in the individual Listings and on the Listed device.

Power ventilators for restaurant exhaust appliances are intended for installation in accordance with NFPA 96, "Standard for Ventilation Control

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and Fire Protection of Commercial Cooking Operations." Authorities Having Jurisdiction should be consulted to determine that these appliances are acceptable for use in any given location.

Proximity type ventilators have an enclosure and are positioned adjacent to the cooking appliance that they serve.

RELATED PRODUCTS

For other types of power ventilators, see Ventilators, Power (ZACT) in the Electrical Appliance and Utilization Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL 705, "Power Ventilators" and Subject 762, "Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Ventilator for Restaurant Exhaust Appliances."

INDEX OF PRODUCT CATEGORIES

This index includes all product categories sorted alphabetically. In addition, those product categories that are a sub-set of a main product category are indented under the main category to illustrate the grouping of a family of related categories. This index also includes specific product types covered within a product category and these product names are followed by the applicable product category in parentheses.

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OVERVIEW OF THE UL FAMILY OF COMPANIES, THE UL MARK AND CONFORMITY ASSESSMENT SERVICES

The UL family of companies worldwide provides an extensive global network of conformity assessment services by thinking globally, acting locally and servicing fully. Globalization of the UL family of companies involves local delivery of a wide variety of conformity assessment services, including product certification programs. In UL's globalized organization, each product certification program can be delivered from many geographical locations in order to meet customer service needs. Those who accept the UL product certification programs, both in the market and in governments, demand consistency and integrity in the programs *regardless of the number of service delivery locations used*. These acceptance interests believe all UL family product certification programs are and will be at the highest possible level of consistency and integrity. UL is dedicated to "working for a safer world."

Clients from around the world request the UL family of companies to evaluate their products to applicable requirements. UL also evaluates products to requirements such as performance, environmental health, energy efficiency, software safety, and electromagnetic compatibility. Manufacturers whose products comply with the appropriate requirements are authorized to apply the UL Mark. UL audits products at manufacturing facilities through its factory Follow-Up Services, a critical part of its comprehensive safety certification program to check the means used by the manufacturers to determine that these products continue to meet the applicable requirements.

To manufacturers, regulatory authorities and consumers, the UL Mark is the most accepted and recognized safety certification mark. These Marks provide manufacturers with enhanced regulatory acceptance in many markets through one submittal process.

UL has been active internationally for more than 70 years, and has developed considerable global safety certification resources and expertise. UL helps manufacturers do business worldwide by identifying applicable international or regional product certification requirements, and by working with organizations in many countries to gain product testing and certification to these requirements.

In addition to investigating and certifying products, UL also conducts assessments of organizations to register them to the ISO 9000 quality management system standards, as well as ISO 13485 and 13488 for medical devices, ISO 14001 for environmental management systems, QS 9000 for automotive industry suppliers and TL 9000 for telecommunication industry suppliers.

Through UL's conformity assessment services which include comprehensive safety certification and quality registration services, and a host of other activities, UL is dedicated to helping manufacturers, regulatory authorities, consumers and other groups to work for a safer world.

UL Marks

The prominence of UL's certification mark, which includes the highly recognizable "UL in a circle symbol," is UL's greatest asset in UL name recognition, since it is applied to nearly 16 billion products each year. The "UL in a circle symbol" is authorized to be used as one of the required elements in UL's certification mark, which is applied to products covered under UL's Listing and Classification Service.

Conformity Assessment Services

UL's Conformity Assessment Services include a broad spectrum of global programs and services that range from its core product safety certification services to management system registration and commercial inspection and testing services.

Listing Service

UL's Listing Service is the most familiar form of UL's product safety certification programs. The UL Listing Mark on a product means that the manufacturer has demonstrated the ability to produce a product that complies with appropriate requirements regarding reasonably foreseeable risks associated with the product. The UL Listing Mark for Canada is applied to products for use in Canada that have been evaluated to Canadian safety requirements. The UL Listing Mark for Canada and the U.S. is applied to products for use in the U.S. and Canada that have been evaluated to the requirements of both countries. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued

compliance of the product with UL's requirements.



UL Listing Mark



UL Listing Mark for Canada and the United States



UL Listing Mark for Canada

Classification Service

With UL's Classification Service, UL determines that a manufacturer has demonstrated the ability to produce a product that complies with its requirements for the purpose of classification or evaluation regarding one or more of the following: (1) specific risks only, such as casualty, fire or shock; (2) performance under specified conditions; (3) regulatory codes; (4) other standards, including international or regional standards; or (5) other conditions UL may consider desirable. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL's requirements.



UL Classification Mark



UL Classification Mark for Canada and the United States



UL Classification Mark for Canada

UL's Classification Mark includes a qualifying statement designated by UL. A UL Classification Mark for Canada is used for products intended for the Canadian marketplace. It indicates that UL has used Canadian standards to evaluate the product for specific hazards or properties. A UL Classification Mark for Canada and the U.S. is used for products intended for the Canadian and U.S. marketplaces. This Mark indicates that UL has used the requirements of both countries to evaluate the product for specific hazards or properties.

Component Recognition Service

Many UL investigations of equipment involve an evaluation of the suitability of components such as relays, thermostats, switches, etc. for specific applications. Where such components are designed to comply with all the construction and performance requirements of the category, they are eligible for UL Listing and suitable for either field or factory installation.

In some situations, components of special design may be incomplete in construction or restricted in performance capabilities and not Recognized for use as field-installed components. These components may be entirely suitable for factory installation on other equipment where the limitations of use are known to the manufacturer and where their use within such limitations may be evaluated by UL.

With UL's Component Recognition Service, UL determines that a manufacturer has demonstrated the ability to produce a component for use in an end product that complies with UL's requirements. This type of evaluation takes into account the performance and construction characteristics of the end product and how the component will be used in that product. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the component with UL's requirements.



UL Recognized Component Mark



UL Recognized Component Mark for Canada and the United States



UL Recognized Component Mark for Canada

UL Recognized Components, or their packaging, are eligible to bear the UL Recognized Component Mark, the UL Recognized Component Mark for Canada, or the UL Recognized Component Mark for Canada and the U.S. **The Recognized Component Mark does not provide evidence of listing or labeling which may be required by the National Electrical Code® or other installation codes or standards.**

For more information about UL's Listing, Classification or Component Recognition Services, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.

Multiple Product Category Evaluation

Under this type of investigation, a product eligible for Listing, Classification or Recognition under more than one product category can be simultaneously evaluated for each category with one product submittal.

Certificate Service

UL's Certificate Service is for field-installed systems consisting of Listed products, or for specific quantities of certain products intended for use at specified locations, where it is impractical to apply the UL Mark to the individual product. A UL Certificate is given to an authorized installer or manufacturer who can then provide it to a property owner or another ultimate user of the product or system.

Listing Card Service

This service provides information to clients on their Listing, Classification or Recognition. For pricing and ordering information, contact UL's Northbrook, Ill., office at (847) 272-8800, ext. 43730 or fax (847) 509-6243.

Multiple Listing, Recognition or Classification Service

At a client's request, UL authorizes the client's distributors, retailers, manufacturers or others to apply their name to specific products submitted by the client, evaluated by UL and authorized to bear the UL Mark. For more information on this service, contact a UL Customer Service Professional at the nearest UL office (see phone numbers listed on page 303).

Other UL Services

In addition to its Listing, Classification and Component Recognition Services, UL can provide manufacturers with a variety of related assessment, inspection and facility registration services.

Field Engineering Services

The UL Mark applies to the product as it is originally manufactured, when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know the effect a modification may have on the safety of the product or the continued validity of the UL Certification Mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate whether such changes "void" the UL Mark, or that the product continues to meet UL's safety requirements.

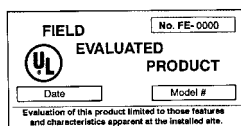
An exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the marking on the product have been evaluated for use in that product.

UL evaluates installed equipment in the field that does not bear the UL Mark as well as equipment with the UL Mark that has been modified after shipment from the factory. A description of UL's Field Engineering Services for installed equipment are described below.

For additional information regarding UL's Field Engineering Services, visit our website at <http://www.ul.com/regulators/field.html>.

Field Evaluation Service

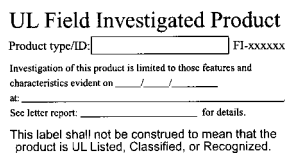
This service covers on-site safety evaluations of installed products or systems, conducted by UL technical staff. UL's Field Evaluated Product Mark (below) can be applied to the product in the field if the product complies with UL's safety requirements.



UL Field Evaluated Product Mark

Field Investigation Service

This service covers on-site safety investigations of installed products that can't be completely evaluated in the field. UL will investigate the product and issue a report to a regulatory authority. The report will describe the tests that could and could not be performed, as well as aspects of the product or installation that comply or do not comply with safety requirements. For the Field Investigation Service, UL does not apply a certification Mark to the product. However, a label (below) can be applied to the product that refers to UL's letter report covering the investigation.



UL Field Investigation Service Label

Field Inspection Service

This service covers on-site safety inspections of products that were eligible to bear a UL Mark at the time of manufacture, but the UL Mark is not present on the product. A UL representative can perform an inspection, and if the product is determined to meet UL requirements, a UL Mark will be applied to the product.

Environmental and Public Health Services

Implementation of the UL Mark for Environmental and Public Health (EPH) Products

Refer to the introduction pages for the description of the UL Mark for Environmental and Public Health (EPH) Products. UL evaluates products and materials in accordance with environmental and public health standards. The UL Mark for environmental and public health products was introduced in October 2000 and implementation of the use of the Mark is underway. For existing Subscribers, the use of this new Mark is optional until the effective dates noted below. New Subscribers, however, are required to use the new Mark immediately. **For additional details on implementation, refer to UL's website: <http://www.ul.com/eph/newmark.html>.**

Industry	Effective Date	Affected Categories
Food Service Equipment	April 1,2003	DUIA,IPMW,TSQS,TSQT,TSQU, TSQV, TSRE,TSVG,TSXL,TSXQ,TSXT, TSXV, TSYA,TSYF,TSYO,VCZU FDPH FDQD FDNP
Drinking Water Treatment Additives	December15,2007	
Drinking Water Treatment Units	December 1,2003	
Drinking Water System Components	December15,2007	

Electromagnetic Compatibility Testing

UL conducts a wide range of electromagnetic compatibility (EMC) tests on many electrical products. These tests include electromagnetic emissions and susceptibility evaluations.



The International "emc-Mark"

UL and five other organizations -- TÜV Product Service GmbH and VDE Testing and Certification Institute of Germany; the Italian Quality Mark Institute (IMQ); the British Approvals Board for Telecommunication (BABT); and Quality Assurance Services Pty Ltd (QAS) in Australia -- offer clients EMC testing and certification to European, U.S., Japanese and Australian EMC requirements. Products may be evaluated simultaneously to the requirements of any combination of these four markets for eligibility to bear the International "emc-Mark" (see above). In addition, clients receive an International "emc-Mark" Certificate, valid for one year, as evidence of EMC compliance. For details on any UL EMC service, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.

Performance Testing

Some products must conform to certain requirements or specifications related to their function, such as those designed for purposes of lighting, heating, cooling, communications or other functions. UL investigates these products for compliance to applicable performance requirements or specifications.

LAN Cable Performance Testing

UL evaluates local area network (LAN) cable for Verification to industry performance specifications. A related program covers electrical connecting hardware for compatibility with LAN cable. For more information on UL's LAN Cable Verification Service, contact a UL Customer Service Professional (see page 303). For more information on UL's program for connecting hardware, contact a UL Customer Service Professional (see page 303).

Energy Verification Service

UL's Energy Verification Service helps manufacturers meet both the requirements of U.S. and Canadian regulations and demonstrate the energy efficiency ratings of their products to inspection authorities, utilities, distributors, customers and others. UL evaluates electric motors, lighting products, household appliances, heating and cooling equipment, and other types of energy-consuming products for energy efficiency. Products covered under UL's Energy Verification Service are shown in UL's Products Verified to Energy Efficiency Standards Directory. For more information concerning this service or to obtain the directory, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.

Other Performance Testing

UL evaluates the performance of many signaling devices such as fire and burglar alarm systems. In addition, UL evaluates telecommunications equipment to Bell Communication Research (Bellcore) specifications, as well as to the requirements of the Federal Communications Commission (FCC) and the Telecommunications Industry Association (TIA). For details about telecommunications equipment testing, contact a UL Customer Service Professional (see page 303).

In addition, UL evaluates products for compliance with the performance criteria of other organizations, including regional and international organizations or industry groups.

UL's Services for Registration of Management Systems

To help companies meet the requirements of their industry, government purchasers and other customers, UL provides accredited management system Registration services to a variety of national or regional standards. UL's Registration services are backed by a century of experience evaluating and inspecting products and systems in many different industries.

Multiple Accreditations and Worldwide Recognition

The Registration Programs offered by UL are accredited by:

UL Registration Program	ANSI-RAB NAP	JAB	ACCREDITATION*		SCC	UKAS
			RvA	SAI		
ISO 9000 Series	X	X	X		X	X
ISO 14001 Series	X		X			X
QS 9000	X		X		X	X
SA 8000				X		
TL 9000	X					

*ANSI-RAB NAP — Registrar Accreditation Board, National Accreditation Program

JAB — Japan Accreditation Board for Quality System Registration

RvA — Raad voor Accreditatie (formerly RvC)

SAI — Social Accountability International

SCC — Standards Council of Canada

UKAS — United Kingdom Accreditation Service

These accreditations, and UL's longstanding reputation in the U.S. and abroad, means that a Registration from UL is recognized and accepted around the world.



**The use of the Accreditation Mark indicates accreditation with respect to those activities covered by the accreditation certificate number 062.*

UL also has an international network of registrar partners to help clients gain local registrations in a variety of countries. With a single registration process, clients can obtain registrations from many of the world's leading organizations.

A Well-known Mark

To further enhance the recognition of a UL Registration, UL provides Registered clients with the UL Registered Firm Mark to use in advertising and promotional materials. Also, the names of UL Registered Firms appear in UL's Registered Firms Directory, used by many purchasers seeking Registered companies.



UL Registered Firm Mark

For more information on UL Registration Programs, or other quality or management system standard requirements, such as AS 9000, BS 8800, TE Supplement, TS 16949, VDA 6.1, call 1-800-2UL-4ISO (1-800-285-4476) in the U.S. or Canada or call the nearest UL office (listed at the back of this Directory). Also visit our website at www.ul.com.

International Services

With the emergence of the global marketplace, manufacturers and exporters are finding opportunities to sell products in many new markets. To enter these new markets, however, their products must meet diverse national, regional and international requirements. With over 70 years in the international arena, UL has the knowledge and experience to help clients gain access to international markets in a smooth and timely manner.

Through cooperative arrangements with international standards, testing, certification and quality registration organizations, UL can evaluate products to other countries' standards and help gain acceptance by multiple certification organizations with one product submittal. UL can help clients receive national certifications under the CB Scheme, assist them in obtaining the European CE Marking and other regional and national marks, and can also Register clients' facilities to international quality and environmental management system standards.

In North America, Europe, Asia and elsewhere, UL has the accreditations, agreements, and affiliate facilities and expert staff to help clients gain access to international markets.

UL's accreditation from the Standards Council of Canada (SCC) enables UL to evaluate products intended for the Canadian marketplace to Canadian codes and standards, and authorize clients to label these products with the UL Mark for Canada -- a Mark accepted in all Canadian provinces and territories. In addition, through UL's affiliation with Underwriters' Laboratories of Canada (ULC), UL can also offer clients with applicable products authorization to use the ULC Mark for Canada. In Mexico, through an arrangement with the government-accredited product certification organizations ANCE and NYCE, UL can help manufacturers anywhere in the world to obtain the NOM Mark, the government-required Mexican certification mark.

UL offers clients worldwide direct European safety certification of their products through UL International DEMKO A/S. UL International DEMKO A/S can provide UL clients with third-party verification to apply the CE Marking to their products. This verification can enable clients to market their products in countries throughout the European Union with a minimum of disruption.

In addition, UL operates several other affiliates in Europe to maximize service to clients. UL's affiliate, UL International (U.K.) Ltd., UL International Germany GmbH, UL International Netherlands, UL International (France) SA and UL International Italia S.r.l., provide local testing of products for European manufacturers, to help them obtain the UL Mark, the UL Mark for Canada and the Danish DEMKO-Mark, and to support their use of the CE Marking for products sold in Europe. UL's U.K. affiliate can also conduct local assessments of client's facilities and register them to the ISO 9000 series standards and other management system standards.

In Asia, UL operates several affiliates and representative offices to maximize service to clients. UL affiliates maintain staff at testing laboratories in Taiwan, Hong Kong, Korea, India and Japan as well as offices in Singapore, Thailand and Malaysia. UL also has representative offices in Guangzhou and Shanghai, China. (addresses for these and other offices are listed at the back of this Directory.)

In addition, UL works with manufacturers in over 90 countries worldwide through nearly 200 Inspection Centers and Local Engineering Service offices, and has associations with other standards and certification organizations throughout the world.

For more information, contact International Compliance Services at the nearest UL office.

Specialized Services

UL has specialized services and staff to help clients and others with various product certification and information needs.

Customer Service Professionals (CSPs)

At each of UL's testing facilities, there are Customer Service Professionals (CSPs) who can answer questions, provide information and assist clients as they work with UL. CSPs help clients understand the product submittal process, identify the UL technical experts and learn about the variety of UL services. Contact a CSP in the United States or Canada by phone at 1-877-ULHELPS (1-877-854-3577) or e-mail customerservice.rtp.com.

Regulatory Services

What are the conditions of installation for products Listed or Classified by UL? How do these conditions relate to installation codes and standards?

UL's Regulatory Services staff can provide answers to questions like these and can also furnish technical information and educational materials.

For more information, contact a Regulatory Services staff member at any of the U.S. offices listed at the back of this Directory or visit us online at <http://www.ul.com/regulators>.

Local Engineering Services

UL's Local Engineering Services (LES) offices give clients access to UL engineers in their own local areas. In key centers around the U.S., UL operates LES offices that offer fast and convenient service. Clients can use these offices as quick sources of information or to receive on-site product investigations, Field Engineering Services or other engineering evaluations locally. The locations and addresses of these LES offices are listed at the back of this Directory.

Fact-Finding Investigations

In the interest of public safety, UL conducts Fact-Finding Investigations on an individual contract basis for manufacturers, trade associations, government agencies and others. Fact-Finding Investigations provide information or data that the sponsor can use, in seeking support for a proposed amendment to a nationally recognized installation code. These investigations result in a Fact-Finding Report. Contact a Customer Service Professional at any of UL's offices (listed at the back of this Directory) for referral to the appropriate engineering staff.

Research Services

One more way that UL serves the interests of the public is by conducting research evaluations -- both for its own use and use by others -- on products or materials to help identify safety concerns and to assist in the development of appropriate safety requirements. This research is particularly useful when new technologies emerge or new safety concerns are explored. UL's research expertise and facilities are available to manufacturers, trade associations, government and other groups. Contact a Customer Service Professional at the nearest UL U.S. office (see the back of this Directory) for referral to the appropriate engineering staff.

Commercial Inspection and Testing Services

UL's trained field representatives and engineers, located throughout the U.S. and in many other countries, are available to perform specific inspections for inspection authorities, government officials, industry groups and others. UL's Commercial Inspection and Testing Services are available for retailers, manufacturers, importers and exporters who require their sources or vendors to have products inspected before shipment. These inspections include Factory Assessment Inspections, First Article Inspections and other inspections as specified by the retailer or manufacturer. For more information, call UL's Northbrook, Ill., office at (847) 272-8800, ext. 43651 or 43778 or e-mail cits@us.ul.com.

UL Information Services

UL's Technical Information Services

Manufacturers, regulatory authorities and other groups look to UL as a uniquely broad and accessible source of technical information in areas such as product testing and certification, domestic and international standards, international compliance requirements, and quality system registration. UL provides a variety of technical information services.

Product Directories

UL's searchable online Product Directories of UL certified products can be accessed at www.ul.com.

UL's printed Product Directories and the Supplement are published annually. Order a Product Directory by contacting UL's Northbrook, Ill., office at (847) 272-8800, ext. 42899. Following is a list of the Product Directories and the Supplement currently available from UL:

<u>Annual Product Directories</u>	<u>Month Distributed</u>
Building Materials	February
Fire Protection Equipment	February
Fire Resistance	February
Roofing Materials and Systems	February
Recognized Component	April
Plastics Recognized Component	April
Electrical Appliance and Utilization Equipment	June
Electrical Construction Equipment	June
Hazardous Locations Equipment	June
General Information for Electrical Equipment	June
Products Certified for Canada	June
Registered Firms	June
Marine Products	August
Flammable and Combustible Liquids and Gases Equipment	October
Heating, Cooling, Ventilating and Cooking Equipment	October
Mechanical Equipment and Associated Products	October
Plumbing and Associated Products	October
Security Equipment	October

UL's Website on the Internet

UL has a home page on the World Wide Web which provides access to a variety of information. Topics include:

- UL Marks;
- UL product testing and certification, facility registration, and related services;
- seminars;
- technical information resources, such as Standards (including access to the Standards Electronic Bulletin Board System) and UL's Online Certifications Directory.
- UL news and activities, including the latest news releases;
- information for regulatory authorities; and
- consumer information, and
- retailers

To access UL's home page on your computer, use this address: www.ul.com.

Helping Clients Promote Their UL Certification in Advertising Materials

By using the UL Mark and references to their UL product certifications in advertising and other communications, UL clients can show their customers that they care about safety. There are certain guidelines clients should follow, however, to be sure they're clearly and accurately communicating this information to their customers.

To promote your UL Certifications, UL's website www.ul.com/mark/show.html provides various tools, including information on how to correctly use the UL Mark in your promotion and packaging. The website also includes downloadable Marks as well as UL staff to contact if you have any questions.

As a service to clients, UL will review their use of the UL Mark and references to UL in promotional copy. Contact the UL staff at the office to which you normally submit your products.

On The Mark -- UL's Publication on Global Conformity Assessment Issues

For UL clients and other constituents, this quarterly publication provides a wealth of timely information on a variety of U.S. and global conformity assessment trends and issues, including global trade opportunities resulting from changes in certification systems around the world. To request a free subscription to *On The Mark*, contact a Communication Services staff member at UL's Northbrook, Ill., office at (847) 272-8800, ext. 43844 or 42440, or send a fax to (847) 509-6235. This publication is also available in an electronic format from UL's Website at www.ul.com/about/otm/index.html.

UL Standards for Safety

UL Standards for Safety and Outlines of Investigation contain the requirements used to investigate products, materials, systems and components to determine whether they are eligible to bear UL's Listing, Classification or Recognized Component Marks, or other applicable UL Marks. UL publishes more than 800 Standards and Outlines of Investigation. Approximately 70 percent of UL Standards have been approved as American National Standards by the American National Standards Institute (ANSI).

UL is a leading developer of voluntary product safety standards in the U.S. and also helps develop and harmonize safety requirements internationally. UL Standards are developed through an open process which includes the input of interested parties. UL Standards are also designed to be compatible with nationally recognized installation, building and safety codes.

For the convenience of users, UL Standards are available in print, in electronic formats on computer diskette or electronic delivery through the Internet, on microfilm or microfiche, and in an electronic format on CD-ROM. UL Standards can be purchased separately, in sets with Standards for similar products, or through UL's Standards Subscription Services. More information on these services is available in UL's Standards for Safety Catalog.

Standards and Standards-on-Diskette Subscription Services

Subscribers to either of these services are informed of proposed Standards requirements and given the opportunity to comment on those requirements before they are adopted.

UL Standards Publications

Standards for Safety Catalog— UL's Standards for Safety Catalog is available online at <http://ulstandardsinfonet.ul.com/catalog/stdscatframe.html>.

To order Standards services

To order UL Standards, Standards Subscription Services and other Standards publications from the U.S. or Canada, call toll-free 1-888-UL33503 or 1-888-853-3503. Callers from other countries can dial Int+415-352-2168. Or fax at (888) 853-3512. For more information on ordering UL Standards, visit <http://ulstandardsinfonet.ul.com>.

UL StandardsInfoNet

UL StandardsInfoNet — the Internet Website for information on UL Standards activities.

UL StandardsInfoNet provides access to UL's current Standards for Safety Catalog and Product Index.

UL StandardsInfoNet provides up-to-date information pertaining to UL's various Standards activities, such as information about new editions, revisions, proposed Standards, Bulletins, and Outlines of Investigation; a list of UL Standards approved by ANSI and the DoD; UL/CSA and UL/IEC harmonized Standards; the scope of each Standard and Outline of Investigation; meeting announcements, and the like.

UL StandardsInfoNet can be accessed at no cost by setting your browser's URL to:

<http://ulstandardsinfonet.ul.com>

Technical Training Seminars

UL offers in-depth, hands-on educational seminars in key areas of interest. Topics covered by UL technical seminars include:

- Appliances: Designing for Compliance to IEC 335-1
- Audio/Video Equipment and Musical Instruments: Designing for Compliance to UL 6500 and IEC 60065
- The CE Marking: Strategies for European Compliance
- EMC: Planning for Compliance in the U.S., Europe, and the Pacific Rim
- Globalability: The Key to International Compliance
- Global Harmonization of Hazardous (Classified) Locations
- Information Technology and Telecommunications Equipment: Designing for Compliance to UL 1950 (3rd Edition)
- Insulation and Thermal Concerns in Magnetics: Designing for Compliance to UL 1446
- The Medical Devices Directive
- Medical Device Software: A Practical Guide to Software Process Control and Documentation
- Medical Equipment and Systems: Designing for Compliance to UL 2601 and IEC 60601
- Plastics in Electrical, Electronic and Mechanical Applications: Specifying and Evaluating Materials for Use
- Roofing Materials and Systems: Designing for Fire Safety
- Test, Measurement and Laboratory Use Equipment: Designing for Compliance to IEC 1010-1, UL 3101-1 and UL 3111-1

UL offers these seminars publically throughout the year, at locations around the world and privately at clients' facilities. For more information on these seminars, contact UL's Seminars Department at the Northbrook, Ill., office at (847) 272-8800, ext. 43481, or send a fax to (847) 509-6283.

In addition, UL offers a variety of seminars on the ISO 9000 Standards for quality assurance, the requirements of ISO 14001 and other quality or management system standards. UL offers these seminars periodically at locations across the U.S. UL can also bring these seminars to clients' facilities. To register, or for more information on these seminars, call Corporate Quality and Reliability at (631) 271-6200 ext. 22629 or send an e-mail to isoseminar@us.ul.com.

List of UL Locations

United States

Testing Facilities

Corporate Headquarters

Northbrook, IL
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096
Customer Service Telephone: +1-877-ULHELPS
(1-877-854-3577)
Customer Service Fax: +1 847 407-1395
Customer Service E-mail:
customerservice.nbk@us.ul.com
Web address: www.ul.com

Fire Protection Division

Northbrook, IL
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096
Customer Service Telephone: +1-877-ULHELPS
(1-877-854-3577)
Customer Service Fax: +1 847 574-4005
Customer Service E-mail:
customerservice.fp@us.ul.com
Web address: www.ul.com

Quality and Reliability Service Division

Northbrook, IL
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096
Customer Service Telephone: +1-800-285-4476
Web address: www.ul.com

Santa Clara, CA

Underwriters Laboratories Inc.
1655 Scott Boulevard
Santa Clara, CA 95050-4169
Customer Service Telephone: +1-877-ULHELPS
(1-877-854-3577)
Customer Service Fax: +1 408 556-6207
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Melville, NY

Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, NY 11747-3081
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(1-877-854-3577)
Customer Service Fax: +1-631-439-6464
Customer Service E-mail:
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Research Triangle Park, NC

Underwriters Laboratories Inc.
12 Laboratory Drive
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Research Triangle Park, NC 27709-3995
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Camas, Washington

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Local Engineering Service Locations

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